PAPERS OF THE ARCHAEOLOGICAL SOCIETY OF NEW MEXICO VOLUME 47 • 2021

A Friend of Kuaua
Papers in Honor of James Conder

EDITED BY
Emily J. Brown, Matthew J. Barbour, Jeffrey L. Boyer, and Genevieve N. Head

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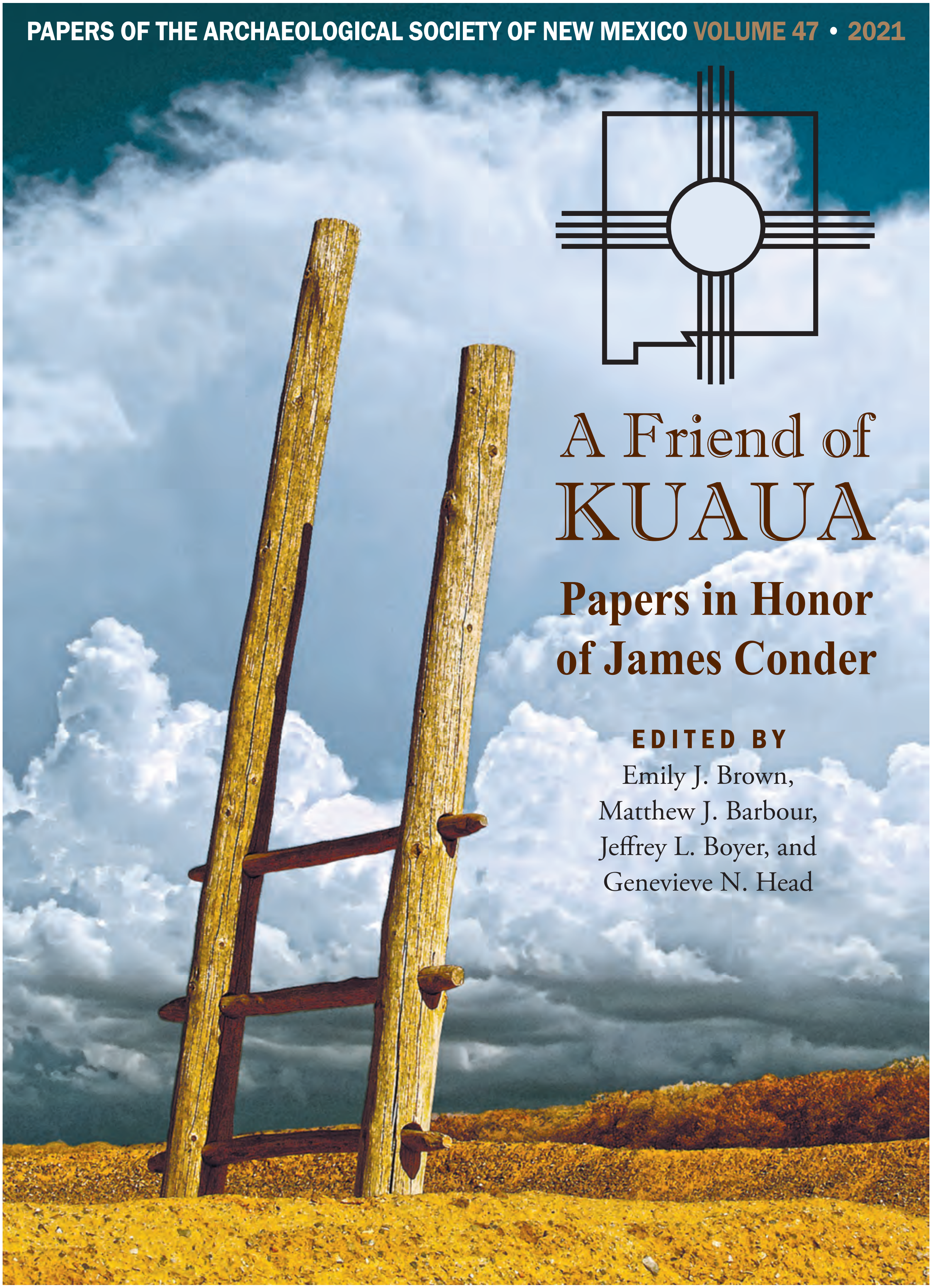

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Statements and interpretations presented in the articles are those of the author or authors and do not necessarily reflect the opinions of the Archaeological Society of New Mexico or its individual members.

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Preface

Archaeological research and the preservation of culture resources is not just the product of the archaeologist who works on the specific project. To be successful, it requires financial resources, public promotion, and sometimes, political support. Often unseen are the countless volunteers and avid supporters who work behind the scenes to make an archaeologist's projects come to fruition.

The Archaeological Society of New Mexico is delighted to publish the 47th Papers of the Archaeological Society of New Mexico in honor of one these invaluable men and women. Friends of Coronado Historic Site President Emeritus James "Jim" Conder has been working to support archaeology and historic preservation throughout New Mexico for the last two decades. Through direct fundraising activities and lobbying, he has helped raise millions of dollars for cultural sites throughout New Mexico.

Jim's fascination with archaeology did not come from academic study, but rather an abiding love for Native American art and culture. It was this love that drove him to visit Coronado Historic Site and to become so heavily involved with the preservation and restoration of the murals at Kuaua Pueblo. However, this is just the tip of the iceberg for a man who has worked to support studies on everything from prehistoric fish populations in the Rio Grande to the distribution of Jemez Mountain obsidians. Many of these research projects are presented herein.

Let this volume serve as thank you to James Conder and the many more like him who work to support archaeology and historic preservation every day. Your contributions do not go unnoticed by the archaeological community and are pivotal to our continued success. Thank you and enjoy!

Matthew J. Barbour
President
Archaeological Society of New Mexico

Leadership, Experience, and Action: Autobiographical Notes and the Founding of the Friends of Coronado Historic Site

JAMES CONDER

Why am I, James Conder, being honored this way by the New Mexico Archaeology Society? I am not an archaeologist and many of you have probably never met me. You may have heard that I am a founder of the Friends of Coronado Historic Site and served as its President for 14 years. But what are my contributions to New Mexico archaeology and/or historic sites? In a few words, what I brought to the sites was a background of leadership, experience, and action.

Autobiographical Notes

My parents, Clester and Margaret Conder, were born in 1901 and 1903 respectively, and were tuned by a very rough existence. Dad was crippled by disease at age two and walked on crutches the rest of his life. As a child in rural southern Indiana, he was transported to school in a goat cart. After his father died in the coal mines, dad clashed with his stepfather and ran away from home—on crutches!

My father had moved from Evansville, Indiana to Detroit, Michigan where he met my mother. Mom had been working since age 14 to help support her widowed mother and younger sister. Mom and dad were married in 1925 and raised five children and supported my grandmother during some very rough times. Dad became a clerk for the Michigan Central Railroad and did clerical piece work for the railroad for 48 years. When he was unable to get to the office, he didn't get paid. All of this, the depression, the war, the riots, etc. made him very independent and strong willed.

The 1930s and 1940s were turbulent and exciting in our inner-city Detroit neighborhood. I was born in the mid-1930s. I vividly recall the times my family had to feed long-lost relatives at the table and unemployed drifters on the back porch. Also, infectious diseases were endemic and antibiotics were not yet available. I missed my first year of school due to sickness and my activity was restricted for several years. So, I learned to read earlier than most other children due to forced confinement. By third grade, I was reading at a sixth-grade level and had developed my mother's love of classical music. Cultural programming was common on the radio during that "pre-TV" time in history.

The late 1930s and early 1940ss were my formative years (Figure 1). My four siblings and I experienced the end of the Great Depression, World War II, and a violent race riot which required federal troops to camp across from our house in Detroit. Masses of European emigrants filled the area speaking various languages (Yiddish and Hebrew were quite common). Diversity was the rule, not a choice. War refugees from Europe and East Asia wandered the streets offering to mend pots and pans, sharpen knives—anything to earn a few coins. All this took place before I was ten years old.

After the war and when price controls were rescinded, my family was evicted and had to separate for about 18 months, living with various

Figure 1. James Conder, lower right, and siblings, ca. 1939.

friends in different parts of the city. My two older brothers were in the military, my older sister lived with a classmate, and my dad found a room with a neighbor. My mother, younger brother and I eventually wound up sharing a bedroom in a friend's house miles from the rest of the family.

In 1948, my dad found an affordable flat in an old neighborhood and reunited the remaining family. By then, I had been in four different schools. Fortunately, I was able to attend my last school from sixth grade through high school, although the family moved three more times within the same neighborhood.

So, where did I begin to learn formal leadership skills? It began in 1948 with Boy Scout Troop 194, a very large troop sponsored by my church and led by army veterans (Figure 2). My street survival skills had been honed during the turbulent times. The Boy Scouts of America provided consistency, leadership training, and opportunities to lead as the troop consisted of over 100 boys, many of whom stayed involved through high school and college, as did I. In 1952, I made Eagle Scout rank and took on advanced troop leadership positions. The underlining theme of Troop 194 was to prepare boys for leadership in life—and the troop leaders were good at it. They also encouraged us to become the first of our families to attend college, which was uncommon in those days.

Figure 2. Boy Scouts of American Troop 194, St. Cecilia's Parish, Detroit, Michigan, ca. 1956.

After graduating with a biology degree from University of Detroit in 1959, I was awarded a teaching fellowship in the Biology Department while attending two more years of graduate school. I had plans to attend Michigan State University in the fall of 1961, but the state went broke and cancelled my fellowship. This setback caused the loss of my student deferment, and sure enough the local draft board called. The draft board gave me two choices: "Either enlist in the service of your choice, or next month you will be the oldest draftee in the city of Detroit." With that incentive, the very next day I decided to join the United States Navy and was eventually sent to Officer Candidate School in Newport, Rhode Island.

This unexpected change of plans turned out to be one of the most serendipitous events in my life. It gave me the practical training and experience that sustained me in my several professional careers and subsequent volunteer experiences. It also allowed me to marry the girl I loved (and still do) and start a family (Figure 3).

Figure 3. James Conder and family, ca. 1980.

After being commissioned as an Ensign in June, 1962, I was assigned as an instructor for the Defense Atomic Support Agency, a tri-service command located at Sandia Base, Albuquerque, New Mexico (now Kirtland Air Force Base). The next three years were spent as a nuclear weapons instructor, a trainer of nuclear emergency response teams, and as a participant in nuclear weapons tests in Nevada. I was eventually named Instructor of the Year. Being a junior officer in charge of and responsible for officers far senior to me was excellent training in leadership and tact. Plus, when I left active duty in 1965, my wife and I knew New Mexico was the area in which we both wanted to eventually live out our lives.

Using my experience in the nuclear weapons field, I accepted a job with the Dow Chemical Company which ran a weapons production plant for the Atomic Energy Commission. We moved to Boulder, Colorado and were there for ten years. At the end of my first year, I was made head of the department known as the Technical Information Office. I was charged with the Security Classification Office, the Patent Office, the Technical Library and Technical Publications including editors, compositors and illustrators. I also headed up the Weapons Complex Classification Committee which consisted of members from Los Alamos, Sandia Albuquerque, Sandia Livermore, and all the national weapons contractors.

In 1975, I accepted a position in a newly formed department at Dow Chemical world headquarters in Midland, Michigan. Called Health and Environmental Sciences, it consisted of the medical staff, the toxicology lab, Industrial Hygiene, Health Physics, Epidemiology and Issues Management. I was classified as an Issues Manager and was the link between Dow and government agencies such as the Occupational Safety and Health Administration (OSHA), the National Institution for Occupation Safety and Health, and the Environmental Protection Agency. We dealt with the deluge of new regulations coming down the pike and how to respond in the comment periods and hearings. Due to Dow's experience in safe handling of toxic chemicals, I also became the regulatory agency's clandestine contact for quietly bringing in their technical staff for advice in safe handling of chemicals and preparation of their technical guides.

In frequent trips to Washington, D.C., I worked through major trade associations and became Chairman of the OSHA Committee of the Synthetic Organic Chemical Manufacturers Association. This put me in a policy development position, and I was soon meeting directly with corporate VIPs, assistant secretaries of federal departments and with the Office of Management and Budget. I was dealing with issues such as occupational health standards, national cancer policy, and environmental regulations. Again, an excellent training ground in leadership and tact.

These assignments lasted another seven years and then I was promoted to Manager of Government and Community Relations for Dow's Eastern Division, which had 11 facilities in seven different states. My "territory" covered 17 states, from Arkansas to Connecticut. I was headquartered in Strongsville, Ohio and lived in nearby Medina. I retired from Dow in 1993 and then took on contract work as an environmental advisor to the Printing Industry of Ohio, a statewide trade association. This opened new doors and fresh experiences, including the time and energy to take up martial arts and earn first and second degree black belts—the last one at age 62.

During my time in Ohio, I was on the Board of the Ohio Chamber of Commerce, The Ohio Alliance for the Environment (which awarded me the coveted Presidents Award for Excellence in Environmental Education), and was appointed by the Governor of Ohio to the Small Business Advisory Council, advising the state's regulatory agencies. I was also an advisor to a large school district and had the honor one year of giving the commencement address to some 2000 students and families.

Figure 4. Ruins of Kuaua Pueblo at Coronado Historic Site. Photograph by Jack Ellis.

Throughout much of my civilian career, I also participated in the U.S. Navy Reserve where I served as Commanding Officer of various units in three different states. My last assignment was Commander of Readiness Unit One in Akron, Ohio. There were about 300 Officers and enlisted members under my command. I retired from the Navy in 1990 as a CAPT, USN (R).

Founding the Friends of Coronado Historic Site

My wife Sharron and I moved to Placitas, New Mexico in mid-1999, having lived in Michigan, New Mexico, Colorado, Michigan once more, and in Ohio for a long stint. Of all the states we explored upon my retirement, New Mexico had the most appeal to us, primarily because of the beauty, history and culture. Shortly after arriving in Placitas, I saw a notice that Coronado State Monument (now Coronado Historic Site) was looking for volunteers (Figure 4). I signed up and after a few months of playing in the mud (patching kiva walls, preparing adobe balls, etc.), I became a docent. This enabled me to lead tours and interact with the public.

Through my docent and preservation work, I was soon deeply involved in the history, culture and preservation of Coronado State Monument. About one year later, the site manager and the Director of State Monuments asked me to help start a friends' group. My response was "start a what?" Despite my ignorance, we gathered a small group and did the preliminary footwork. I negotiated a Memorandum of Understanding with the Director and worked with others to get the "Friends" incorporated and obtain tax exempt status. This work took about two years. Along the way most of the other volunteers dropped out, but we then gained key recruits from the docent corps and other motivated volunteers.

I was asked to become President of the Friends of Coronado State Monument (Historic Site) during this period but declined as I was already president of another group and vice-president of the local recycling association, as well as our homeowner's association. Fortunately, Katherine Pomonis, a fellow docent who had retired from the Maxwell Museum agreed to take the president's job for six months. I became vice-president by default.

Our first board meeting was held in May 2003 (Figure 5). It consisted of the five members

Figure 5. Founding members of the Friends of Coronado State Monument (now Friends of Coronado and Jemez Historic Sites). From left to right: Roy Skeens (fund raising), Jim Conder (Vice-President), Pat Harris (Secretary), Katherine Pomonis (President), Angie Manning (Manager), and Luther Rivera (Treasurer).

recruited thus far: Katherine Pomonis (President), James Conder (Vice-President), Patricia Harris (Secretary), Luther Rivera (Treasurer), and Roy Skeens (Fund Raising and Publicity). Sadly, both Roy and Luther have now passed away.

Luther had us open our wallets and purses at the first meeting and garnered enough to pay the fees for our incorporation and filings. In truth, his first Treasurer's report at our next meeting was scratched on the back of an envelope. It wasn't long enough to warrant a piece of paper. Due to Katherine's contacts from her days at the Maxwell, the Board put together an impressive set of lectures, field trips, demonstrations, workshops, tours and social events. In the very first year we grew from five to over 100 members.

Katherine resigned as president after just six months to devote more time to developing programs for the Friends. I became president and served in that capacity until 2016. In 2018, my successor as president suddenly had to move out of state, so our vice-president served out the remaining months of his term. Then, I was called back as acting president during 2019. I am currently President Emeritus and still sit on the Board of Directors.

During my tenures, the Friends of Coronado State Monument has evolved and expanded. This included a name change in 2012 to the Friends of Coronado Historic Site. We now have over 400 members and have extended our support to nearby Jemez Historic Site. We created several special events including "Fiesta of Cultures" and "Christmas at Kuaua," and developed a very successful gift shop, The Sunfather's Way, which helps fund Historic Site preservation and maintenance needs.

Throughout all of this, the Friends have been blessed with a series of talented and motivated members of the Board of Directors. Together with our members, we have given tens of thousands of volunteer hours and raised several million dollars for New Mexico Historic Sites. This has made it possible to preserve and educate the public about the world class murals of Coronado Historic Site's painted kiva (which I suspect you are soon to read about in this book).

What was the key to our successes? Leadership, experience and action. My background prepared me for the challenge of working with others to solve problems and achieve results. We were fortunate to attract volunteers and board members with similar skills, and were privileged to work with gifted, motivated and energetic Historic Site staffs and other members of the state Department of Cultural Affairs. The results speak for themselves and I am immensely proud of the work we have done together (Figure 6).

Figure 6. Jim Conder crossing the Jemez River. Photograph by Richard Harris.

New Mexico's State Monuments

MATTHEW J. BARBOUR AND GREGORY SCOTT SMITH

The State of New Mexico first authorized the establishment of "state monuments" in the spring of 1931. The clear intent of the legislature was to enable the State of New Mexico, initially through the State Land Office, to protect resources of cultural (i.e., "historic/prehistoric sites") or scientific value located on state-owned lands. The New Mexico statute was modeled on the federal Antiquities Act and strongly supported by Dr. Edgar Lee Hewett, a nationally known advocate for preservation.

> **Sessions Laws of New Mexico**, Chapter 42, Section 2, 1931.
>
> An act for the conservation of the scientific resources of New Mexico (H.B. No. 124):
>
> Approved March 14, 1931
>
> Decreed by the Legislature of the State of New Mexico.
>
> That a Commissioner of the State Land Office is hereby authorized, on the recommendation of the Science Commission and subject to the approval of the Commission of Public Land, to declare through public proclamation that historic and prehistoric ruins as well as other objects of scientific interest that are situated on land belonging to or administered by the State of New Mexico, will be state monuments, and may reserve as part of these [state monuments] such parcels of land as is necessary for the proper and vigilant care of those objects that have to be protected.
>
> Que el Comisionado de la Oficina de Terrenos de Estado queda por la presente autorizado a recomendacion de la Comision de Ciencia supracitada con la aprobacion del Comisionado de Terrenos Publicos para declarar mediate proclamacion publica que los vestigios historicos y prehistoricos y otros objetos de interes cientifico que esten situados en terrenos de propiedad de o administrados por el Estado de Nuevo Mexico, sera monumentos de estados, y podra reservar como parte de ello tales parcelas de terreno que fueren necesarias el cuidado propio y vigilancia de los objetos que se han de proteger.

Originally, five monuments were designated in 1935: Coronado (Figure 1), Gran Quivira, Jemez, Pecos, and Quarai (Table 1). This initial suite of state monuments consisted exclusively of Native American villages that had been locations of first contact with Spanish colonists and Franciscan missionaries. At the time, these places featured prominently in statewide archaeological research which focused on both the grandeur and scale of Native American communities in the American Southwest and the relatively early dates (which predated most colonial period sites on the east coast of the United States) associated with European arrival in New Mexico.

Three more sites were added in 1938: Abo, Paa-ko, and the Glorieta Battlefield.

Figure 1. Coronado State Monument during the Cuarto Centennial Celebration of 1940. Photo courtesy of the New Mexico Department of Cultural Affairs, New Mexico Historic Sites.

The Glorieta Battlefield (Figure 2), site of a decisive Civil War battle that ended the Confederate invasion of New Mexico, was the first state monument that was not a Native American archaeological site, though it was near the Native American archaeological site of Pecos. It was also the first site designated as a state monument *before* the land on which it was located was acquired by the state, and its designation served as the impetus for the site's acquisition in 1940. The Old Lincoln County Courthouse in Lincoln and the Palace of the Governors in Santa Fe were added in 1939 and 1940, respectively. Both of these sites had been at the center of many important events and at the time of designation these two historic buildings were already administered by the Museum of New Mexico (MNM). Management of culturally significant sites was not a role for which the State Land Office was well suited, so the MNM was tasked with the day-to-day oversight of state monuments. Thus, designation of the Old Lincoln County Courthouse—central to the story of the Lincoln County Wars and where Billy the Kid was briefly incarcerated—and the Palace of the Governors as state monuments represented an early step toward establishment of a separate division within the MNM that would eventually be named New Mexico State Monuments. In the case of the Palace of the Governors (*El Palacio*—the Palace, the seat of government under three flags and the oldest continuously occupied public building in the United States), however, the property was

Table 1. New Mexico's State Monuments.

SITE	Established	CURRENT STATUS[a]	COMMENTS
Coronado	1935	NMHS	
Gran Quivira	1935	Transferred to NPS in 1959	
Jemez	1935	NMHS	
Pecos	1935	Transferred to NPS in 1965	
Quarai	1935	Transferred to NPS in 1981	
Abó	1935	Transferred to NPS in 1981	
Paa-ko	1938	Defunct	UNM acquired the site in 1927, which operated as a state monument between 1938 and 1957.
Glorieta Battlefield	1938	Transferred to NPS in 2002	
Old Lincoln County Courthouse	1939	NMHS	Additional properties added and reorganized as Lincoln State Monument in 1979.
Palace of the Governors	1940	NMHS	Open to the public, but managed separately.
Folsom	1951	SLO	Currently inactive; not open to the public.
Mesilla Plaza	1957	NMHS	Now managed as part of Barela-ReynoldsTaylor.
Fort Sumner/BRM	1968	NMHS	Renamed the Bosque Redondo Memorial in 2005.
Fort Selden	1973	NMHS	
Dorsey Mansion	1973	Defunct	Sold to private owners in 1985.
Mimbres	1976	SLO	Better known as Woodrow Ruin, open only for occasional tours.
Barela-Reynolds-Taylor	2004	NMHS	
El Camino Real de Tierra Adentro	2005	NMHS	Closed, not open to the public.
Fort Stanton	2007	NMHS	
Los Luceros	2019	NMHS	

[a] NMHS = New Mexico Historic Sites, NPS = US National Park Service, SLO = New Mexico State Land Office

never actively managed by New Mexico State Monuments despite being officially designated as a state monument. Instead, the Palace is currently managed by the New Mexico History Museum, which is located adjacent to the site.

After 1940, the designation of new state monuments slowed considerably. The Folsom Site—the first site in North America where distinctive stone tools were found unambiguously associated with remains of extinct bison—was added in 1951, and Mesilla Plaza in 1957. Like the Palace of the Governors, neither has been actively managed as a state monument. Instead, they are managed by the State Land Office and Town of Mesilla, respectively. Nevertheless, Folsom was an important designation because the archaeology of the site is key to understanding New Mexico's Paleoindian past. Mesilla Plaza played an important role in nineteenth-century New Mexico. An extant building on the southeast corner of the Mesilla plaza was the location of the signing of the Gadsden Purchase Treaty in 1853 which added 30,000 square miles to the territory of the United States. La Mesilla was the county seat of Arizona

Figure 2. Excavation of the Confederate mass grave adjacent to Glorieta Battlefield State Monument in 1987. Photo courtesy of the New Mexico Department of Cultural Affairs, Office of Archaeological Studies.

County for nine years (1854-1863) as well as the short-lived capital of the Confederate State of Arizona. It was also the location of Billy the Kid's fateful trial for first-degree murder in April 1881; he was convicted and sentenced to be hanged on May 13, 1881.

The United States' entry into World War II naturally led to a reordering of state government priorities for the duration of hostilities and efforts to identify and designate sites worthy of preservation virtually came to a halt for the next two decades. In fact, limited appropriations and lack of staffing severely curtailed management of the existing state monuments. To reduce costs and provide the best management possible given the unique nature of each site, Gran Quivira and Pecos state monuments were transferred to the National Park Service in 1959 and 1965, respectively. Both of them became significant components in larger federal parks—Salinas Pueblo Missions National Monument and Pecos National Historical Park, respectively.

Paa-ko, a large pueblo site on the east side of the Sandia Mountains, was briefly opened to public visitation in the 1950s under the aegis of the MNM. An existing building was converted into a small visitor center, and a minimal staff was hired to oversee tours of the site. Visitation was limited due to the location, however. Paa-ko had been jointly managed in partnership with the University of New Mexico (UNM), so in 1959 day-to-day operation of the site was transferred exclusively to UNM. As of 2013, the MNM still held a one-half interest in the property via a 1938 deed of transfer but had no role in operating the site. Paa'ko is not open for regular visitation.

Interest in identifying and designating new state monuments finally began to increase in the late 1960s. A wish list of additional properties to be developed and managed as state monuments was drafted in 1967 under Governor David Cargo. The MNM tasked archaeologist Alfred Dittert (of the MNM Research Section) with writing a comprehensive plan for a new system of New Mexico state monuments. This was another key development in the establishment of a separate division—formerly known as New Mexico State Monuments and now officially renamed New Mexico Historic Sites—within the MNM for managing these sites. The costs of research related to Dittert's plan (travel, surveys, etc.) were paid for via a federal grant provided under Section 701 of the federal Housing Act of 1954.

Twenty-five sites were considered in the plan. This included 21 newly proposed state monuments as well as major developments at Abó, Glorieta, Mesilla, and Quarai. The development at Mesilla was very ambitious as it argued for acquiring all the properties surrounding Mesilla Plaza except the church. Mesilla was not the only town targeted this way. Among the other municipalities suggested as potential locations of new state monuments/historic districts were Hillsboro, Taos, and West Las Vegas. There was also a focus on preserving former frontier military posts, including Fort Sumner, Fort Bayard, and Fort Cummings. Of these proposed, only Fort Sumner would become a state monument (in 1968). Fort Selden, near Las Cruces, which was not mentioned in Dittert's plan, was designated shortly thereafter in 1973 (Figure 3).

New Mexico State Monuments made a significant transition in the 1970s. First, authority for the designation of new state monuments was transferred to the Governor of New Mexico in 1978:

> **Section 18-6-17 NMSA 1978**
> **Designation of state monuments**; reservation of lands for monument care and management. The governor is authorized, upon the recommendation of the committee and the board of regents of the Museum of New Mexico, to declare by public proclamation that

Figure 3. Aerial overview of Fort Selden State Monument. Photo by Robert Paquette, courtesy of the New Mexico Department of Cultural Affairs, New Mexico Historic Sites.

> any cultural property situated on lands owned or controlled by the state shall be a state monument and may reserve as a part thereof such parcels of land as may be necessary for the proper care and management of the cultural property to be protected. In the case of proposed state monuments situated on state trust lands, the federal laws granting same shall be complied with. Any such monument shall be administered by the Museum Division of the Department of Cultural Affairs in accordance with the provisions of Section 18-6-6 NMSA 1978.

This breathed new life into the process of identifying and designating sites that warranted preservation. Thus, in addition to Fort Selden, the State of New Mexico acquired Dorsey Mansion in 1973 (designated 1975), Mimbres in 1976, and additional properties in the town of Lincoln in 1979. With Lincoln, New Mexico State Monuments assumed control over multiple historic properties within a single town, which was consistent with the model proposed by Dittert in 1967. On the other hand, it is important to note that Lincoln was not even considered in Dittert's plan despite having been a state monument since 1939 (Figure 4).

The acquisition of Mimbres and Dorsey was no less ambitious. The Mimbres site, better known to archaeologists as Woodrow Ruin, is an expansive Native American village of more than 300 rooms in southwest New Mexico. The Dorsey Mansion is a 36-room Victorian-style ranch headquarters in northeast New Mexico that was built in the late 1870s and early 1880s. Both sites are located in relatively remote locations. Mimbres has never been open for public visitation; it is currently jointly managed with the State Land Office, and New Mexico Historic Site staff provide occasional tours. The Dorsey Mansion was open to the public from 1975 to 1983 but was closed and sold to a private land holder shortly thereafter. Efforts to maintain and preserve the historic buildings at the site simply proved too expensive given the level of visitation that it received.

New Mexico State Monuments experienced a period of significant decline in the 1980s and 1990s. Abó and Quarai were transferred to the National Park Service in 1981 and along with

Figure 4. Old Lincoln County Courthouse at Lincoln State Monument. Photo by Kenneth Walter, courtesy of the New Mexico Department of Cultural Affairs, New Mexico Historic Sites.

Gran Quivira are currently managed as Salinas Pueblos National Monument. The National Park Service had plans to acquire state-held sections of the Glorieta Battlefield as early as 1993. Federal interest was sparked by the discovery of a mass grave of Confederate soldiers (killed in the Battle of Glorieta Pass in March 1862) on private land adjacent to the state-held property in 1987. The State of New Mexico transferred its interests in Glorieta Battlefield to the National Park Service in 2002. While some residents of New Mexico might have preferred to retain direct control over these sites, the reality was that by preserving these sites until they could be incorporated into larger federal parks, the main goal of designation—preservation—was accomplished.

The MNM, which had ostensibly overseen the management of state monuments since 1931, was disbanded in 2003. Each operating unit within the MNM system became an independent division within the Department of Cultural Affairs. Thus, New Mexico State Monuments gained new opportunities to both expand and rebrand for the twenty-first century. In 2003 the family of John Paul Taylor of Mesilla agreed to donate their family home—the Barela/Reynolds/Taylor property located on the west side of the Mesilla Plaza—to the State of New Mexico. It was designated a state monument (separate from Mesilla Plaza) in 2004 (Figure 5). This was followed in 2005 by the redesignation of Fort Sumner to include the Bosque Redondo Memorial and the opening of the El Camino Real de Tierra Adentro/International Heritage Center (IHC) south of Socorro.

The redesignation of Fort Sumner was viewed as a more inclusive approach to management which highlighted the fact that the military post had been constructed to administer to the Bosque Redondo

Figure 5. Dining room at Barela/Reynolds/Taylor State Monument. Photo by Tom Conelly, courtesy of the New Mexico Department of Cultural Affairs, New Mexico Historic Sites.

Indian Reservation. This reservation had housed several thousand Mescalero Apache and Navajo people during the American Civil War. El Camino Real IHC was designed to interpret and promote the historic trail that had connected Santa Fe and points north with Mexico City in the south. The State Monuments expansion continued with the addition of Fort Stanton State Monument in 2007 and Los Luceros State Monument in 2019. While representing very different narratives in New Mexico history—a United States military post and a Spanish Hacienda—both were large-scale acquisitions with multiple historic buildings. These latest two sites follow the pattern of multiple properties developed at Lincoln in 1979 and argued for by Dittert a decade earlier.

New Mexico State Monuments was renamed New Mexico Historic Sites in 2013. Like many other changes that have occurred over the past decades, this rebranding has its roots in Dittert's 1967 study, which was entitled: *New Mexico Historic Sites: A Survey*. Of the more than twenty sites that have been designated state monuments since 1931, nine are currently managed by New Mexico Historic Sites; another five are managed by the National Park Service; and the remaining six are managed through a mix of state, municipal, and private entities. Regardless of their current status, all of these sites have—for the most part—been preserved for the benefit and enjoyment of future generations. Those sites open to the public have recorded *millions* of visitors over the past ninety years. For more information on New Mexico's "state monuments" today, please visit www.nmhistoricsites.org.

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LA 112420, An Early Developmental Pithouse Along US 550 in Bernalillo, New Mexico

KENNETH L. BROWN

In 2017, TRC Environmental Corporation (TRC) was contracted by the New Mexico Department of Transportation (NMDOT) to develop and implement a research design and data recovery plan for LA 112420, located along US Highway 550 (US 550) for a new bridge and approaches across the Rio Grande within the town of Bernalillo, New Mexico. The project was completed with federal funds, and the Federal Highway Administration (FHWA)/NMDOT was the lead agency (Brown and Wells 2019:1–2).

Background

LA 112420 was first registered as such in 1996 by TRC Mariah Associates, Inc. (Evaskovich et al. 1996). At that time, the site contained two thermal features and a small artifact assemblage consisting of flaked stone and brownware sherds identified as Lino Gray. The NMDOT revisited the site later the same year in anticipation of a road improvement project along NM 44 (now US 550) (Roxlau 1996). The site was then redocumented during a survey in 2012 by SWCA Environmental Consultants (Walth et al. 2012). Marron and Associates visited the site in December 2016 and identified one of the two original thermal features (Mattson et al. 2016; Wells 2019a:3–9). Based on surface pottery, LA 112420 was interepreted to have Early Developmental (Basketmaker III/Pueblo I, ca. A.D. 400–900) and Classic period (Pueblo IV, A.D. 1300–1600) components (Brown and Wells 2019:1–2).

Data Recovery

TRC's data recovery, between July and August of 2017, consisted of five phases. Phase 1 consisted of surface mapping and collections (Wells 2019b:51–54) (Figure 1). Phase 2 was digging 13 test units totaling 3.25 square meters of surface area (Wells 2019b:55) (Figure 1). Phase 3 consisted of digging five trenches across the site using a tractor-mounted backhoe (Wells 2019b:55–57) (Figure 2). Phase 4 consisted of mechanically scraping more than half of the site area within the US 550 north right-of-way (Wells 2019b:57) (Figure 2). Phase 5 was manual excavations in five block areas (Wells 2019b:58–60) (Figure 3). The location of Block 1 was chosen to encompass an area of high surface artifact density and the two exposed stains (Features 1 and 2) that were recorded during previous surveys (Evaskovich et al. 1996; Mattson et al. 2016; Roxlau 1996; Walth et al. 2012). Blocks 2 through 5 explored areas with surface artifact concentrations (Wells 2019c:61–109) (Figure 3).

A total of 147 artifacts were mapped and collected from the surface of LA 112420 (Wells 2019c:61) (Figure 1). The five backhoe trenches resulted in the collection of limited artifacts (n=3) and no prehistoric or historic features (Figure 2) (Wells 2019c:62). A total of 229 prehistoric and historic artifacts were recovered from 13 shovel tests, 90 percent of which came from the disturbed loose sandy loam of the upper 20 cm with no artifacts recovered from a depth of 40 cm below the surface (Wells 2019c:66) (Figure 1).

The surface area of hand excavation totaled

Figure 1. LA 112420, locations of collected surface artifacts and test units.

Figure 2. LA 112420, locations of mechanical scrapes and trenches.

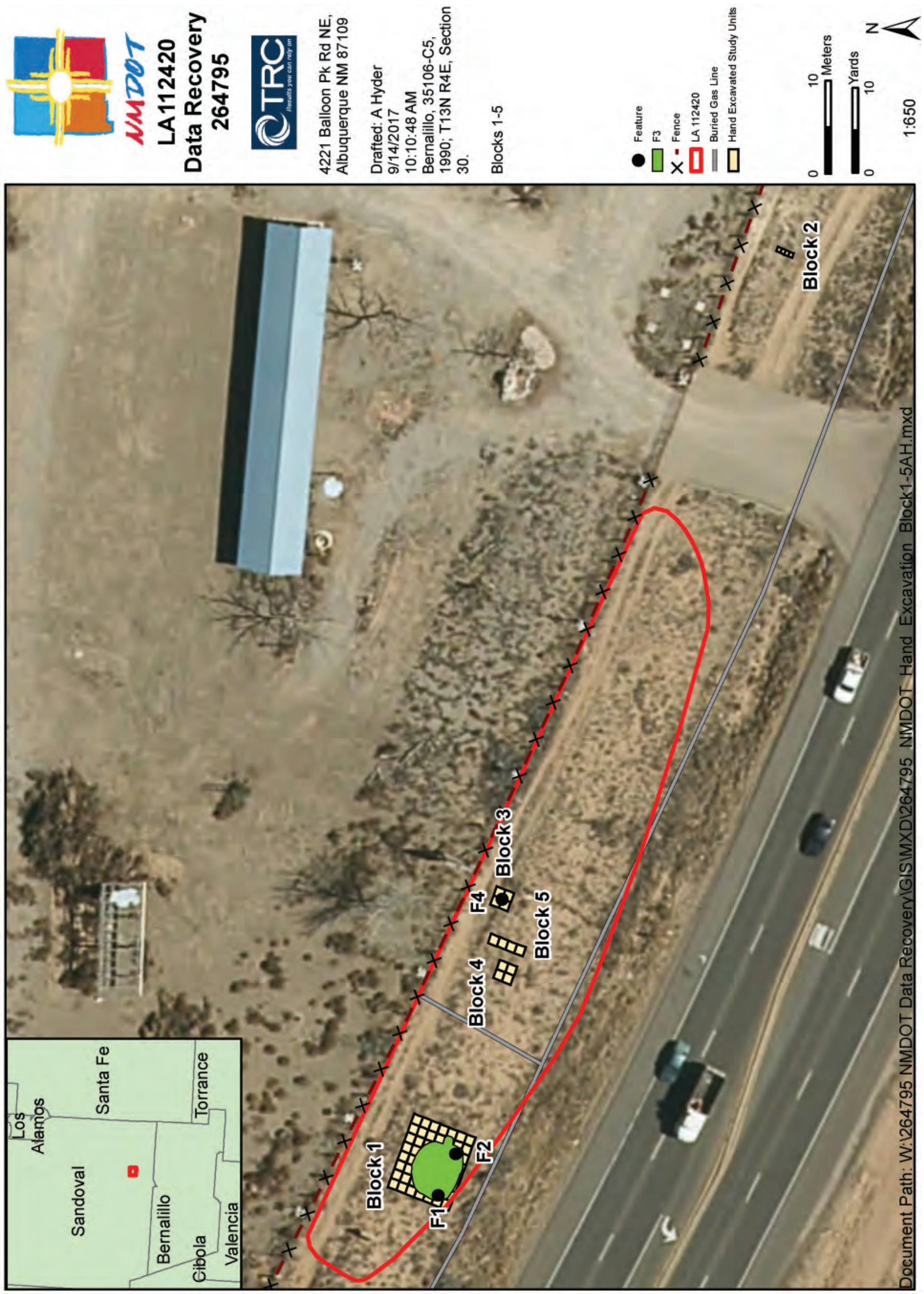

Figure 3. LA 112420, locations of manually excavated block units.

86 square meters (Figure 3). Excavation from these blocks resulted in the recovery of 3,326 total artifacts (ceramic, lithic, faunal and historic), 242 samples (flotation, pollen, adobe, sediment, radiocarbon, macrobotanical), and the identification of 26 features (Wells 2019c:79) (Table 1). The following discussion focuses on Block 1, a 7 x 8 m (56-m^2) area that included excavation of Features 1–3 and 5–26. Feature 3 was a well-preserved pithouse (Wells 2019c:66).

Table 1. Features in Block 1 at LA 112420.

Feature Number	Feature Type	Planview	Profile	Length	Width	Maximum Depth
1, 2, and 5	Thermal features subsumed into Feature 3	N/A	N/A	N/A	N/A	N/A
3	Pit structure	Circular	Straight sides, flat bottom	5.5 m	4.7 m	35 cm
6	Depression on floor; ash pit	Circular	Basin	40 cm	45 cm	5 cm
7	Small depression on floor; function unknown	Oval	Basin	26 cm	22 cm	3 cm
8	Small depression on floor; function unknown	Circular	Basin	20 cm	20 cm	6 cm
9	Small depression on floor; function unknown	Circular to oval	Basin	21 cm	22 cm	1 cm
10	Small depression on floor; probable krotovina	Undetermined	Irregular	15 cm	Unknown	12 cm
11	Small depression on floor; possible irregular floor surface/divot	Irregular	n/a	35 cm	28 cm	0.5 cm
12	Posthole	Circular to oval	Cylindrical	30 cm	30 cm	66 cm
13	Ash pit	Irregular	Irregular	80 cm	70 cm	6 cm
14	Possible portion of burnt wall or clay anomaly	No planview, only visible in profile	Angular (L-shaped)	5 cm	5 cm	Ca. 20 cm
15	Posthole	Oval	Cylindrical	30 cm	24 cm	38 cm
16	Posthole	Circular	Cylindrical	30 cm	30 cm	55 cm
17	Posthole	Circular	Cylindrical	30 cm	30 cm	40 cm
18	Hearth	Circular	Irregular	60 cm	60 cm	7 cm
19	Krotovina	Irregular	Irregular	Unknown	Unknown	Unknown
20	Posthole or krotovina	Irregular	Irregular	35 cm	30 cm	3 cm
21	Possible entrance or ventilator	Possibly rectangular	Unknown, possible incline	Ca. 1.5 m	Ca. 1 m	Unknown
22	Posthole	Oval	Cylindrical	30 cm	20 cm	60 cm
23	Posthole or krotovina	Oval	Irregular	18 cm	15 cm	Unknown
24	Posthole or krotovina	No planview, only visible in profile	Irregular	30 cm	12 cm	Unknown
25	Posthole or krotovina	Irregular	Irregular	24 cm	18 cm	Unknown
26	Posthole or krotovina	No planview, only visible in profile	Irregular	Unknown	15 cm	15 cm

The Pithouse

The remnants of the circular pithouse, identified as Feature 3, had vertical walls and a flat floor of sterile sand. Neither appeared to have been plastered with adobe. The structure measured approximately 5.7 m (north-south) by 6.5 m (east-west). The remnants of an adobe (possibly wattle and daub) superstructure were evident in the adobe melt along the pithouse edges. The roof, which burned, consisted of beams, brush and adobe (Figure 4). It was supported by four posts, one in each quadrant of the structure (Wells 2019c:70).

The uppermost stratum consisted of a light brown (7.5 YR 6/3) to reddish brown (5 YR 5/4) sandy loam with increasing frequencies of artifacts and charcoal flecks toward the bottom of the layer. The second stratum from the burned and collapsed roof (and possibly walls or portions of walls), was characterized by mottled sandy loam and charcoal-stained sandy loam with pockets of charcoal and ash, burned wood and patches of hardened burned clay. The roof thatching collected from the collapsed roof was identified as *Populus*/*Salix*, cottonwood/willow, as was 85 percent of all the wood identified from the pithouse (Wells 2019c:71) (Figure 4).

The roof fall contained a mud dauber nest in which small spiders were packed and were carbonized when the pithouse burned and collapsed. These provided the most precise dating material and information regarding the season the pithouse was abandoned (Wells 2019c:109). A total of 21 floor and wall features were found in the structure but nearly half of them were the result of natural causes (i.e., rodent activity) (Figure 5). Cultural features included four postholes for the central roof support (Features 12, 16, 17, and 22), a central hearth (Feature 18) and associated ash pit (Feature 13), a posthole or storage cist in the north wall (Feature 15), an entrance or ventilator on the east edge of the structure (Feature

Figure 4. Intact roofing materials in west wall profile of Unit 51.

Figure 5. Excavated pithouse.

21), and a shallow floor depression (Feature 6) (Wells 2019c:76) (Table 1, Figures 5 and 6).

A break in the pithouse wall at the east-southeast margin within SU 37 was believed to be a possible entrance, Feature 21 (Table 1, Figure 7). Two stacked slab metates and a one-hand mano overlying a projectile point situated between the central hearth and Feature 21 could suggest a ritual importance (Figure 7). Other artifacts from the structure included a ceramic pipe or "cloudblower" collected from roof fall within SU 47 (Figure 8), and a modified sherd shaped into a circle and embedded in the floor in SU 50. Ten complete and fragmented projectile points were recovered from post-depositional fill, roof fall, floor or near-floor contexts, and the original ground surface outside of the structure (Wells 2019c:79). Burning of the pithouse upon its abandonment is believed to be purposeful and may also be associated with potential offerings.

Explanations often offered for site abandonment include: 1) problems with obtaining sustenance in the surrounding area; 2) warfare; 3) disease or natural catastrophe; or 4) ritual causes (Cameron 1990:28). Earth covered pit structures are very difficult to burn, thus accidental conflagration through carelessness or warfare are unlikely (Cameron 1990:29; Glennie 1983; Wells 2019c:93; Wilshusen 1986). Ethnographic accounts indicate burning of residential structures is commonly done because of either ritual requirements or insect infestation. Among the Navajo, a hogan is abandoned and burned if an individual dies inside (James and Lindsay 1973; Jett and Spencer 1981:28). Among the Maricopa, if any resident of a house died, the house was dismantled and burned (Spier 1970:83). Burning of structures in the Southeast may have been done to rid the structures of insects (Cameron 1990:29, 34, 35; Chagnon 1968:25; Posey 1976; Simpson

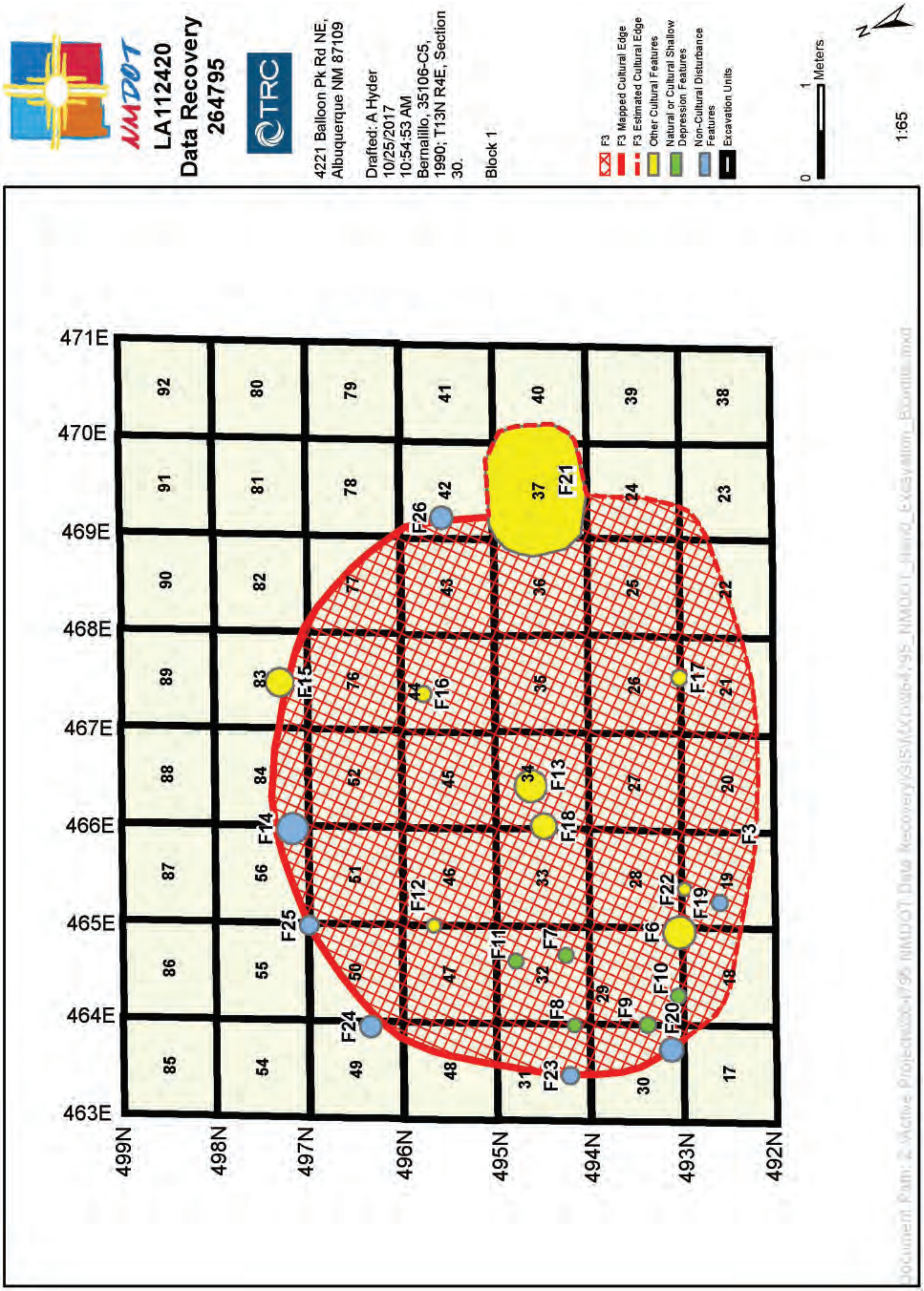

Figure 6. Planview of Block 1, pithouse, Feature 3.

Figure 7. Stacked metates and mano.

1961:35; Starna et al. 1984; Wells 2019c:93–95).

Given previous research regarding the burning of Developmental Period pit structures in New Mexico, the burned pithouse at LA 112420 fits a similar pattern of ritual abandonment and subsequent burning. First, the two stacked slab metates and one-hand mano atop a projectile point near the entrance fits the abandonment ritual observed amongst Mimbres pit structures. Second, there were no fill deposits between the floor and the collapsed roof. Third, the presence of mud daubers in the ceiling of the roof may indicate insect infestation. Only one of the four main support postholes contained remnants of burned timbers, suggesting the remaining posts were removed, possibly for recycling. Hence, the ethnographic and archaeological evidence strongly indicates the pithouse at LA 112420 was ritually abandoned and intentionally burned (Wells 2019c:95).

Chronometric, Geomorphological, and Environmental Studies

The radiocarbon dating of annuals helps to avoid the "old wood" problem created by perennials, especially juniper and mesquite (Dykeman 2003:374). Several suitable *Zea mays* cupules and a kernel fragment were culled from flotation for radiocarbon dating (Brown 2019a:111–112). In addition, the burned mud dauber nest recovered from the pithouse roof fill had sealed cells containing charred remains of spiders. These spiders were identified to family or genus and one was radiocarbon dated. The nest was present in the roof at the time the pithouse burned (Condie 1996:66), thereby providing an accurate date for when the structure burned (Brown 2019a:111–112). In addition, five clay lenses exposed in the backhoe trenches and three carbon samples (one *Zea mays* cupule

[Feature 12], one *Zea mays* kernel [Feature 3], and a charred spider [Feature 3]) were submitted to Beta Analytic for AMS dating the Early Developmental occupation of the site (Table 2).

LA 112420 occurs on a middle Pleistocene gravel terrace about 9 m above the present channel of the Rio Grande. The site itself is associated with alluvium that was deposited in an ephemeral wash on the terrace surface during the late Holocene. The geology of the site was assessed by mechanically digging five backhoe trenches. Twelve sediment samples were collected from the sedimentary deposits and submitted for particle size analysis. Five AMS radiocarbon dates were obtained on bulk sediment from stratigraphic units exposed in the five trenches (Table 2). The surficial deposits at LA 112420 consist of three depositional units, a soil A horizon, and overlying historic fill. The units are numbered 1, 2, and 3, oldest to youngest. Unit 1 is a local terrace deposit of coarse gravel derived from the ancient Rio Grande and is Middle Pleistocene in age (Connell 1998). Holocene mixed alluvial-eolian deposits overlie the gravel on which LA 112420 is associated (Hall 2019:111) (Figures 8 and 9).

Unit 2 at LA 112420 is the basal deposit that locally mantles the middle Pleistocene terrace gravel (Los Duranes Formation). It is interpreted as alluvium that was deposited by a local wash on the terrace surface; it may also incorporate some reworked eolian sand. Locally, it is a pale-light brown to brown (7.5-10YR 5-6/3) sandy silt with 8 to 16 percent clay. It is about 1 m thick and is massive without bedding. The unit does not incorporate paleosols. The geochronology of the deposits is defined by three AMS radiocarbon dates: 9270 ± 30, 9170 ± 30, and 5430 ± 30 ^{14}C years B.P. Based on these dates, the overall age of Unit 2 is approximately 11,000 to 6,000 calendar years before present. It correlates with the early and middle Holocene (Hall 2019:119) (Figures 8 and 9).

Unit 3 is the younger Holocene deposit and the LA 112420 Early Developmental period features

Table 2. Summary of accelerator mass spectrometry (AMS) dates for LA 112420.

Beta #	Location	Measured Age/ Conventional Age BP	C13/C12	Calibrated Age 68% Probability	Calibrated Age 95% Probability
478431	Trench 2, Unit 3, organic sediment, 56–60 cm	1780±30	-19.8	276–328 A.D. 216–262 A.D.	137–334 A.D.
478432	Trench 2, Unit 3, organic sediment, 105–115 cm	5430±30	-16.2	4301–4261 B.C. 4335–4314 B.C.	4342–4242 B.C.
478433	Trench 3, Unit 3, 15–20 cm	540±30	-19.6	1396–1426 A.D. 1329–1340 A.D.	1388–1437 A.D. 1316–1354 A.D.
478434	Trench 4, Unit 2, 105–110 cm	9270±30	-18.7	8566–8461 B.C.	8618–8423 B.C. 8378–8350 B.C. 8405–8391 B.C.
478435	Trench 5, Unit 2, 60–70 cm	9170±30	-18.9	8351–8300 B.C. 8426–8402 B.C. 8395–8371 B.C.	8467–8292 B.C.
488443	FS 410, Feature 12, SU 46, 3.7 mg, *Zea* cupule	1230±30	-10.7	686–774 A.D.	676–779 A.D. 790–870 A.D.
488445	FS 798, Feature 3, SU 28, 4.7 mg, *Zea* kernel	1380±30	-9.5	638–668 A.D.	606–680 A.D.
488446	FS 803, Feature 3 roof fall, SU 35, mud daubers nest, charred spiders	1240±30	-17.5	689–750 A.D. 760–778 A.D. 842–860 A.D. 792–804 A.D.	684–780 A.D. 787–876 A.D.

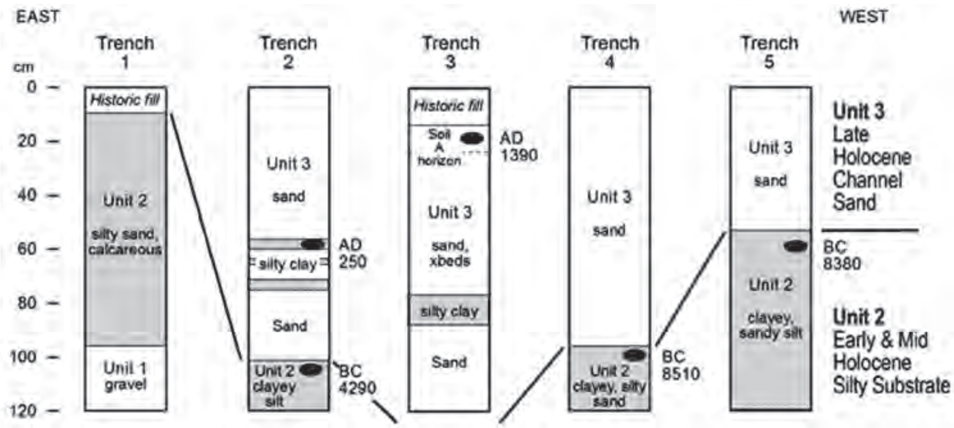

Figure 8. Stratigraphic profiles of five trenches. All of the deposits are alluvium. The five radiocarbon ages are presented in Table 2. LA 112420 is associated with the upper level of the late Holocene channel sand.

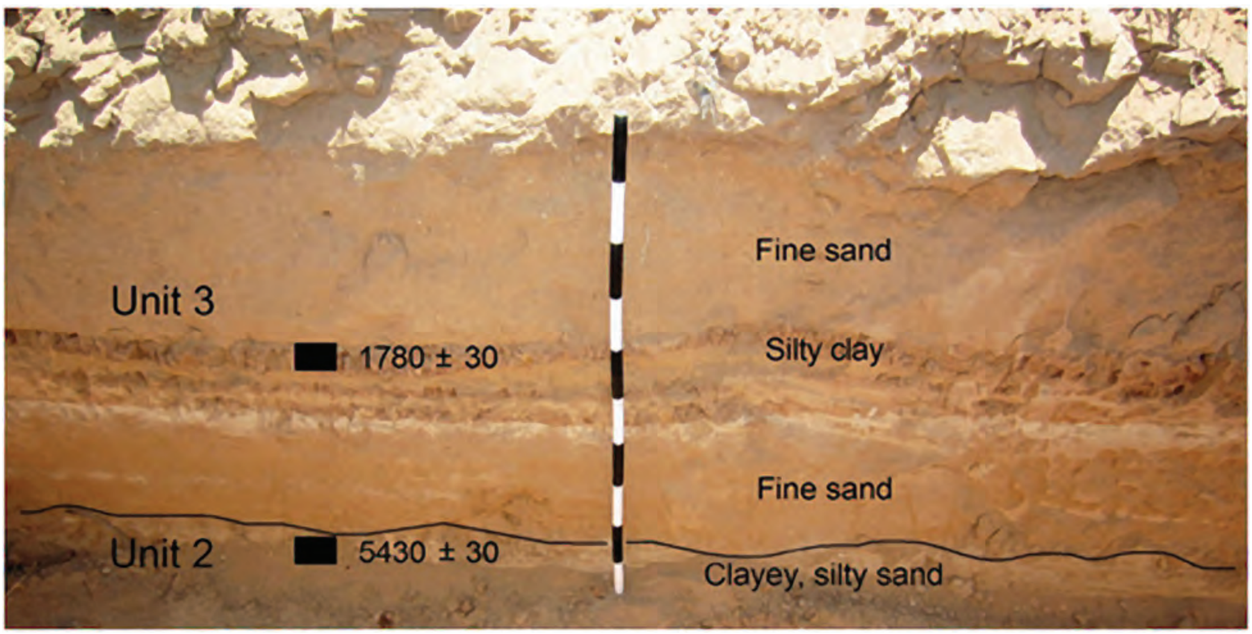

Figure 9. Trench 2; Units 2 and 3 fluvial sands.

and artifacts associated with this unit. The unit represents sand that was deposited in the channel of a wash that had been eroded down into the underlying substrate sometime between about 6,000 and 2,000 years ago. The channel was cut down about 1 m into the Unit 2 silt deposits. The width of the channel is uncertain but probably extended no more than about 130 m (Hall 2019:117). The Unit 3 sediments are predominantly light brown (7.5YR 5-6/4) “clean” sand with less than 5 percent silt and less than 4 percent clay. The sand is well sorted, and the size class is fine sand. The Unit 3 sands incorporate one to four thin beds of reddish brown (5YR 4/4) silty clay. The beds are 2 to 11 cm thick and represent clay drapes and muds that accumulated in low places in the channel of the old wash. The geochronology of Unit 3 is based on one AMS radiocarbon date from a silty clay bed in the middle of the unit, 1780 ± 30 ^{14}C years B.P, and an AMS radiocarbon dated from a soil A horizon that occurs at the top of the unit sand, 540 ± 30 ^{14}C years B.P. The age of Unit 3 is approximately 2,000–500 calendar years before present (Hall 2019:118) (Figure 9).

A soil A horizon occurs at the top of the Unit 3 fluvial sand. The presence of the soil indicates that the local landscape was stable for a period of time. The color of the A horizon sand is brown (7.5YR 5/3), slightly darker than the underlying sand of Unit 3 which is light brown (7.5YR 6/4). An AMS radiocarbon date on the organics, mostly soluble humic acids, in the A horizon is 540 ± 30 ^{14}C years BP (A.D. 1390). The geometry and internal structures of the sedimentary deposits, especially the cross-bedded sands and the thin clay beds, are indicative of a fluvial environment of deposition (Hall 2019:118) (Figure 9).

Stable carbon isotopes of organic matter, reported as δ^{13}C values, provide information on local vegetation. Different groups of plants have significantly diverse pathways of photosynthesis, resulting in a unique chemistry in plant tissues, called C_3 and C_4. C_3 plants are woody, consisting of most trees and shrubs are C_3. C_4 plants are mostly grasses. The C_3 and C_4 pathways produce different δ^{13}C signatures. C_3 woody plants have δ^{13}C values that are less than -9‰ (more negative), and C_4 grasses have δ^{13}C values that are more than -19‰ (less negative) (O'Leary 1988). The five AMS radiocarbon dates from alluvium have δ^{13}C values ranging from -16.2 to -19.8‰ spanning the period 600 to 10,500 calendar years B.P. During the early Holocene the local vegetation was mixed shrub-grass. The middle Holocene vegetation was grassland with only a few shrubs. More recently, during the late Holocene, A.D. 250 and 1390, the local vegetation was grassy shrubland. Present-day potential natural vegetation in the vicinity of LA 112420 is mapped as a "mixed dropseeds-Indian rice grass association" with scattered sand sagebrush and yucca (Donart et al. 1978; Hall 2019:120).

Ceramic Analysis

A ceramic sample of 618 sherds (1.0 cm or larger) was recovered from LA 112420 (Table 3). The sherds represent the primary Early Developmental, Basketmaker III period (Feature 3 pithouse) and a light scatter of Pueblo IV period glazeware pottery (Marshall 2019:133). Of the 618 sherds analyzed, 365 are from the pithouse (Feature 3) and 253 are from other site contexts. The primary characteristic of the ceramic assemblage is its highly fragmented nature that probably relates to the small erosional channels observed by during excavation. In addition, small sherd size can be a proxy for assessing the amount of cultural and natural affects upon the integrity of the site. LA 112420 has been exposed to extensive disturbance within the US 550 right-of-way. The assemblage is dominated by Plain Lino

Table 3. Ceramic ware-type frequencies from the Early Developmental, Basketmaker III, component at LA 112420.

Ware-Type Groups	Surface, Shovel Tests and Scrapes	Feature 3 Pithouse Area	Total	Percent
Lino Gray	209	346	555	95.52
Lino Gray Incised	1		1	0.17
Lino Gray Wide Coil		3	3	0.52
Lino Gray Fugitive Red	1	6	7	1.22
San Marcial B/W[1]		3	3	0.52
Tallahogan Red		1	1	0.17
Plain Brown	2	3	5	0.87
Totals	**213**	**362**	**575[2]**	**100**

1. San Marcial sherds often occur in low frequencies in Rio Medio Basketmaker III sites.

2. This sample does not include sherd fragments less than 1.0 cm in size. Three glazeware sherds were apparently introduced into the fill of Feature 3 by rodent burrows and are not included in this total.

Gray, with minor quantities of Lino Fugitive Red and traces of Tallahogan Red, Mogollon Plain Brown, and textured Lino materials (Marshall 2019:133).

Little information on vessel forms could be obtained from the sample due to high vessel fragmentation but most appear to have been jars with a few bowls. It has been observed that the earliest forms of pueblo pottery tend to mimic container forms, such as gourds and baskets that were in use prior to the inception of the ceramic art (Cushing 1886:483). This is a pattern found throughout Western North American in tribal groups at the time when the ceramic arts were first developed (Ingbar 1983:26; Marshall 2019:134). The pipe or "cloudblower" and the worked sherd were processed for starch residue, but no starch residue was recovered (Figure 10). The worked sherd, a Lino Gray fragment, was embedded in the floor of the pithouse (Feature 3) suggesting it is either a *puki* (a base or mold used to manufacture pots) or a pot rest (Wells 2019d:140–141).

Flaked Stone Analysis

The flaked stone assemblage consisted of 2,078 items, including cores (n=38), debitage (n=1,991), tools (n=37) and projectile points (n=12). The flaked stone artifacts derive from both the surface (n=86, 4.1 percent) and excavated contexts (n=1,992, 95.9 percent). The majority of subsurface artifacts are from Feature 3, the burned pithouse, and its immediate vicinity (n=1,539, 77.3 percent of excavated artifacts) (Wells 2019e:143).

The selection of raw materials is often guided by what is locally available and in what form (Andrefsky 1998:40; Crabtree 1982:2; Wells 2019e:145). The most prevalent raw material include chalcedony (n=1,273, 61.3 percent), chert (n=379, 18.2 percent), basalt (n=182, 8.7 percent), obsidian (n=85, 4.1 percent), and quartzite (n=77, 3.7 percent). Chalcedony and chert come in several varieties including Pedernal chert. Pedernal chert is recognizable as a transluscent to semitransluscent

Figure 10. Ceramic pipe, from SU 47 (roof fall).

white and gray material that often includes black inclusions; although there can be significant color variability represented even within a single core. The primary source for this particular variety is the Pedernal Member of the Abiquiu Formation in the northern portion of the San Pedro-Sierra Nacimiento range but is also locally abundant among secondary gravel deposits in the Albuquerque Basin (Murrell and Murrell 2015; Wells 2019e:151).Obsidian, as referred to above, combines several varieties of obsidian and rhyolite most likely derived from the Jemez Mountains, but may have been procured from gravels available in the immediate vicinity of the site. Three specific primary source locations were identified by XRF analysis—Cerro Toledo, Valles, and Bear Springs Peak.

Burned lithic artifacts comprise 28.7 percent of the assemblage recovered from the burned pithouse. With the burning of the pithouse, one might expect the incidence of burned lithics to be higher. The high frequency of unburned artifacts can be partly explained by differential burning and variation in intensity of the pithouse fire. Also, many artifacts are likely out of stratigraphic context due to bioturbation and not where they may have been during the fire (Wells 2019e:156).

The debitage is made up of 5.6 percent primary flakes, 16.3 percent secondary flakes, and 78.1 percent tertiary flakes. This distribution fits the pattern of a core reduction technology rather than the bifacial reduction that is more characteristic of earlier Archaic lithic technologies (Elyea 1985:59). The trajectory of core reduction technology naturally results in the lowest proportion of primary flakes, followed by a higher proportion of secondary flakes, and finally the highest proportion being tertiary flakes. However, examination of assemblages from the Olé project in the Jemez Mountains refutes this argument (Dello-Russo 1997:101–105). Similarly, the proposed pattern of flakes less than 5 mm thick being characteristic of bifacial tool trajectories versus thicker flakes greater than 5 mm thick being characteristic of unifacial/expedient flake tools may also not be verifiable based upon results of lithic studies for the Olé project (Dello-Russo 1997:101–105; Wells 2019e:156).

Two different types of lithic strategies are indicated at LA 112420. Initial lithic reduction stages presumably involving hard hammer percussion were conducted outside of the pithouse, with less standardization and control over the size of the waste materials. Smaller overall debitage sizes are represented within the pithouse implies tool manufacture and maintenance activities emphasizing the use of pressure flaking techniques were conducted indoors (Wells 2019e:161).

A total of 37 formal flaked stone tools were identified and include unifacial scrapers (n=19), biface blanks (n=2), choppers (n=2), a multifunctional tool (n=1), drill (n=1), and projectile points (n=12). Informal tool types were also represented in the form of gravers (n=5), denticulates (n=2), and retouched flakes (n=4), in addition to utilized flakes (n=4) (Wells 2019e:165). Most of the tools, excluding projectile points, were manufactured from chalcedonies and cherts (n=31) as well as basalt (n=4) and rhyolite (n=1). A little over half of the tools are complete (n=21) with distal (n=9), lateral (n=2), and distal-lateral (n=2) specimens also occurring. The high occurrence of distal fragments and their relatively small size suggests most of the implements were likely hafted to bone or wood handles rather than being hand-held. Implement edge angles span 35 to 75 degrees. This range in edge angles suggests use of the flaked stone implements for generalized tasks involving food and hide processing, specifically working hides, bone, and wood (Wells 2019e:168).

Eleven projectile points were recovered during excavation, with all but one coming from burned pithouse or immediate vicinity. Another was recovered from the surface by NMDOT staff during a site visit and included in the current assemblage (n=12). Most of the projectile points are base and blade fragments of small triangular arrow points. A few of the fragments are too small to assign to a specific type. However, most are complete enough to identify according to type and fall within the Cienega Cluster (Justice 2002:216–226), Dolores Cluster (Justice 2002:240–245), and Chaco Cluster (Justice 2002:246–260; Wells 2019e:176) (Figures 11–13).

The projectile point observed on the surface by NMDOT and Marron (Mattson et al. 2016:36) staff was not collected. Based on the available photograph (Mattson et al. 2016:36) the point, made of translucent obsidian, compares favorably with the Tularosa Corner Notched type. Specimen FS 446#1 (Figure 11) is made of Cerro Toledo obsidian and is assigned to the Chaco Corner Notched type. These points are thought to date from approximately A.D. 750–850 until ca. A.D. 950. Specimen FS 444 (Figure 12) is also assigned to the Chaco Corner Notched type (Wells 2019e:181). Specimen FS 717 (Figure 13), made of Valles Rhyolite obsidian, is nearly complete and is assigned to the Chaco Corner Notched type (Wells 2019e182).

The projectile point sizes indicate use of the bow-and-arrow for hunting and defensive purposes. Hunting may have focused on smaller game which coincides with the paucity of bone fragments that would indicate larger animals such as deer were not frequently procured. Some of the points exhibit evidence of reworking and/or having been discarded in possibly ritual activities at the time of the abandonment of the pithouse (e.g., the projectile point beneath the stacked metates).

Bifacial tools would have been more suitable for working harder materials like bone or wood. The few bifaces recovered from LA 112420 have limited signs of use or none at all, indicating activities involving wood and bone working was minimal or they were continually rejuvenated through retouching, which may explain the predominance of small tertiary debitage within the pithouse. Evidence of light duty hide scraping and other game and plant processing activities, on the other hand, are plentiful at the site (Wells 2019e:184).

Analysis of 30 obsidian artifacts from LA 112420 identified items originating from three

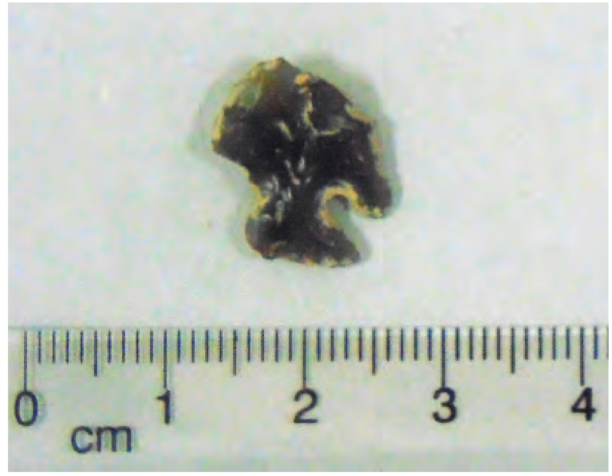

Figure 11. Chaco Corner Notched projectile point (FS 446#1).

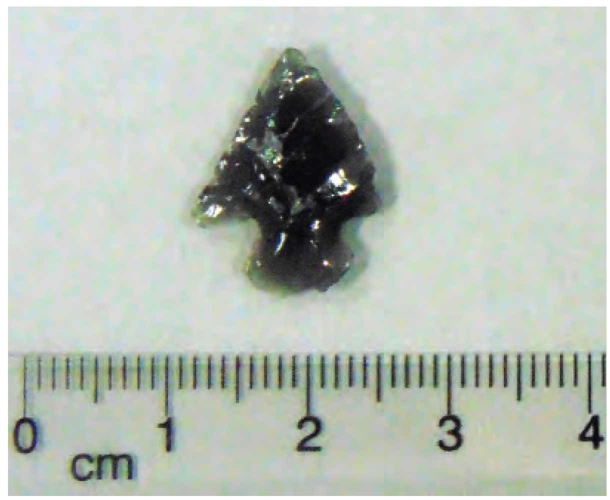

Figure 12. Chaco Corner Notched projectile point (FS 444).

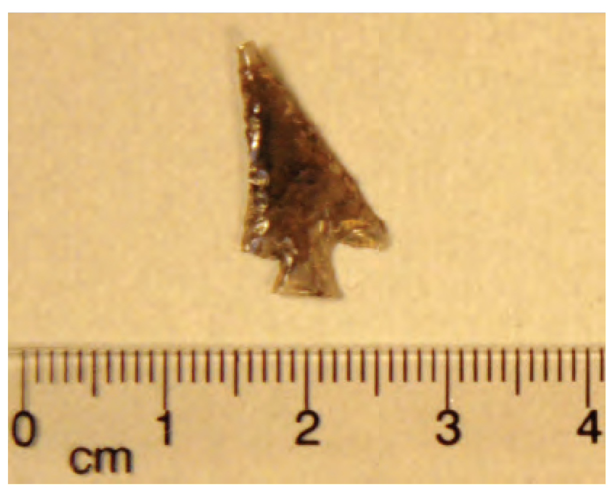

Figure 13. Chaco Corner Notched projectile point (FS 717).

sources from the Jemez Mountains, two of which are available in Rio Grande Quaternary alluvium as secondary deposits on the terrace where the site occurs (Shackley 2012, 2019:189). While Cerro Toledo Rhyolite and Canovas Canyon Rhyolite (Bear Springs Peak) obsidian is readily available in Rio Grande Quaternary alluvium up to at least 10 cm in largest dimension, Valles Rhyolite is very uncommon and all less than 2 cm in largest dimension (Church 2000; Shackley 2012). While it cannot be ruled out that the Valles Rhyolite (Cerro del Medio) obsidian at LA 112420 could have come from Rio Grande alluvium, it is more likely, especially the one projectile point and one fragment, that the raw material was originally procured at Cerro del Medio or in the Valles Caldera proper (Shackley 2012, 2019:190) (Table 4).

Table 4. Frequency distribution of obsidian sources at LA 112420.

Source	Frequency	Percent
Cerro Toledo Rhyolite	21	70
Valles Rhyolite (Cerro del Medio)	6	20
Canovas Canyon Rhyolite (Bear Springs Peak)	3	10
Total	**30**	**100**

Ground Stone Analysis

Most of the ground stone items were directly associated with the pithouse. Two complete double-sided slab metates and a one-hand mano were recovered from a stacked position near the east entryway to the pithouse (Figure 7). The presence of manos with metates is indicative of food grinding and preparation activities. However, their position inside the structure may be associated with the "ceremonial or ritual closing" of the pithouse (Brown 2019b:195).

Collectively, the ground stone assemblage consists of two complete slab metates, three manos, 14 hammerstones, seven natural tabular stone "palettes", one piece of ground calcium carbonate ($CaCO^3$), three large cobbles from the edge of the pithouse, one tabular/oval cobble with an incised line, and 47 small cobbles and fragments. The assemblage (N=78) is entirely from excavated contexts. The two complete slab metates are of fine-grained quartzite and andesite and the three manos are one-hand types made from quartzite cobbles. One mano is two-sided and the other two are single-sided (Brown 2019b:197).

According to Adams (1999, 2002), flat or concave metates and manos were more efficient for grinding oily seeds, and later in the archaeological record, soaked maize kernels. Having higher oil content, or having the kernels soaked before grinding, made it easier to keep them on the flat grinding surface. Hard seeds and kernels, however, scatter unless confined to a deeper basin or trough metate. The two complete flat metates recovered from the pithouse appear to correlate with Adams' (1999, 2002) suggestions on the function and technique behind slab or concave metates and their accompanying manos (Brown 2019b:200).

Faunal Analysis

The vertebrate faunal assemblage (N=189) totals 94 specimens from excavations and 95 specimens recovered from flotation. The assemblage includes 23 eggshell fragments and 13 freshwater mussel shell fragments too small to identify as to taxon. Only two taxa, *Sylvilagus* sp. (cottontail) and *Lepus californicus* (jackrabbit) were identified for the vertebrate remains, both are considered cultural in their occurrence. The cottontail specimens (n=8) consist of mostly low meat value elements with only a humerus being of a high meat value. The low meat value elements represent butchering debris. The jackrabbit (n=1) consists of only a low meat value lower leg element—an ulna—which also represents butchering debris (Brown and Brown 2019:220–221).

Most of the vertebrate assemblage was recovered from near the pithouse's central hearth (Feature 18), as one might expect. Although the burned remains probably represent hearth cleaning debris, the burning may also be attributed to the burning of the pithouse. The absence of intrusive faunal remains from the burned pithouse suggests bioturbation as a result of animal burrowing is not as severe as the krotovina exposed during excavation suggests. The paucity of the vertebrate faunal remains indicates the pithouse floor was relatively clean at the time of abandonment and burning (Brown and Brown 2019:231–233). All of the unidentified specimens are of small and very small mammals of which 13 specimens are calcined and three are blackened. The high incidence of fragmented unidentified unburned and burned small animal bones in these contexts strongly indicate the pithouse was abandoned prior to its having burned, rather than being occupied and the burning resulting from a catastrophic event (e.g., warfare, lightening). No modified bones were recovered (Brown and Brown 2019:226).

Although no turkey vertebrate remains were recovered, eggshell analysis was undertaken to determine if the Rio Grande turkey may have been present at LA 112420 following guidelines developed by McKusick (1981:51). However, the shell thicknesses range from 0.55 to 0.64 mm with a mean average of 0.57 mm for the excavated assemblage (n=17) and 0.54 to 0.59 mm with a mean average of 0.56 mm for the flot assemblage (n=6). These are beyond the greater range of turkey, suggesting they may represent other avian fauna, such as the sandhill crane (*Grus Canadensis*) and Canada goose (*Branta canadensis*) (Brown and Brown 2019:223–224; Schorger 1966).

All freshwater mussel shell, consisting of 13 small fragments, was from the pithouse. The shell was likely procured from the nearby Rio Grande. The fragments total 0.51 grams, or less than 0.04 grams per item. No nonlocal shell was recovered (Brown and Brown 2019:224).

Collectively, the LA 112420 faunal assemblage is indicative of a hunting economy focused on small game, particularly leporids which are an r-selected species. They have high reproductive rates and, during good weather, breed nearly all-year in the Albuquerque area (Chapman et al. 1982:94; Clark and Stromberg 1987:78, 81; Findley 1987:57–58; Hoffmeister 1986:131, 137; Zeveloff 1988:93). The absence of fish and other aquatic taxa suggests the nearby Rio Grande, presently located 240 m east of the site, was not a primary source for acquiring food resources. Instead, it appears the inhabitants of LA 112420 were opportunistically hunting small game attracted to their agricultural fields. Noteworthy is the absence of worked bone for use as implements and ornaments which supports the likelihood that the pithouse was cleaned of usable items and abandoned prior to its burning (Brown and Brown 2019:231–233).

Other Analyses

The pithouse burned roof fall yielded a charred mud dauber nest imbedded in the burned adobe (Figure 14). TRC solicited the services of Matthew Leister and Sandra Brantley from the Museum of Southwestern Biology to identify the spider remains associated with the nest (Leister et al. 2019:235). The mud dauber nest is most likely attributed to either of two wasp species, *Sceliphron caementarium* (black-and-yellow mud dauber) or *Chalybion californicum* (blue mud dauber). Both species are not aggressive, seldom sting, and are active from spring through fall (Evans 2007:361; Leister et al. 2019:233). Twenty-six distinct spiders were found in three sealed cells. Ten spiders are in the family *Thomisidae* (seven males, one possible female, two undetermined gender), eight are in the family *Theridiidae* (one female, seven undetermined gender), one is in the family *Araneidae* (undetermined gender), one is in the family *Philodromidae*, genus *Ebo* (undetermined

Figure 14. Mud daubers nest showing cells.

gender), and six cannot be definitively identified beyond order (*Araneae*) (Leister et al. 2019:235) (Figure 15). One spider produced an AMS date of 1240±30 B.P. (Beta 488446), with a corrected range spanning A.D. 684–876 (95 percent probability), placing the pithouse during the Early Developmental, Basketmaker III, period, which corresponds with the dated *Zea mays* cupule and kernel (Leister et al. 2019:239).

Eleven artifacts were submitted for lipid analysis. Fatty acids are the major constituents of fats and oils (lipids) and occur in nature as triglycerides, consisting of three fatty acids attached to a glycerol molecule by ester-linkages. Three artifacts—a one-hand mano, a cooking stone, and a chert scraper—yielded lipid residues most likely resulting from preparation of large herbivores, such as bison, deer, elk, or other bovines or cervids. A palette and chert scraper yielded lipid evidence of conifer products, which may have been introduced from pine nuts (e.g., piñon) and other conifer products. Lipid residue on a reworked projectile

Figure 15. Charred spider, Family Thomisidae.

point/knife indicates it was derived from animal products other than large herbivores but compatible with lean animal flesh, like that of lagomorphs, which is consistent with the faunal assemblage (Mailaney 2019:248–252, 254).

Twenty-seven flotation samples from 14 features and 10 macrofossil samples were submitted for macrobotanical analysis. A limited suite of 14 dietarily significant plants was recovered: grass, maize, ricegrass, chenoams, squash/gourd, chenopod, dropseed, tansy mustard, mustard family, cactus family, globemallow, goosefoot family, dock/knotweed, and bulrush. Maize and squash were cultivated nearby and would have been central foods. That grasses were an important adjunct to the maize and squash is indicated by the high ranking ricegrass and the presence of dropseed (Huckell 2019:291).

Botanical analysis identified 18 carbonized taxa and 27 uncarbonized taxa. Seven taxa are present in both categories. The seven taxa found exclusively in a carbonized state are *Zea, Brassicaceae, Cactaceae*, *Chenopodiaceae, Phragmites*, *Rumex/ Polygonum*, and *Schoenoplectus*. *Zea maize* in the form of cupules, glumes and kernel fragments was recovered from 14 flotation samples taken from eight features. Three kernel remains were obtained from the roof fall. Cupules were obtained from 14 samples. Among the 153 cupules recovered, the larger, more complete specimens all display an axially compressed rectangular shape that conforms to Early Developmental period maize that, in response to a proposed influx of new eight-rowed Mexican germplasm in A.D. 700–900, developed larger cobs with larger kernels that required broader cupules (Huckell 2006, 2019:275).

Sixteen artifacts were processed for pollen and opal phytoliths. Two of the 16 artifacts were large double sided metates; each of their two surfaces were sampled separately for botanical remains and thus a total of 18 samples were processed. A total of 20 phytolith types were identified. Two maize cob phytoliths were recovered from the two stacked slab metates, demonstrating both had been used for grinding maize. Of the fifteen pollen genera identified, six taxa are edible, including *Pinus edulis* (piñon pine), *Ephedra torreyano* (Torrey's jointfir), cholla, cleome, cruciferae, and cheno-am (Bozarth 2019:304).

A single artifact, a ground stone tool, yielded two damaged starch grains (Figure 16). The grains are consistent with the typical morphologies found in some grasses and are very likely derived from a *Panicoideae* grass, the subfamily that includes maize (*Zea mays*) and common prairie grasses like big bluestem (*Andropogon gerardi*). The grains exhibit surface damage that is consistent with that derived from grinding starchy grass grains in laboratory settings. Their presence on the ground stone tool fragment combined with the observed damage is a solid indicator that starchy plants, and grass seeds in particular, were processed with this stone. The absence of starch residue in the control sample indicates that the starch grains are likely associated with cultural activity at the site. Thus, grasses were present at the site and were being processed using stone implements, possibly for the production of grits or flour (Perry 2019:312–313).

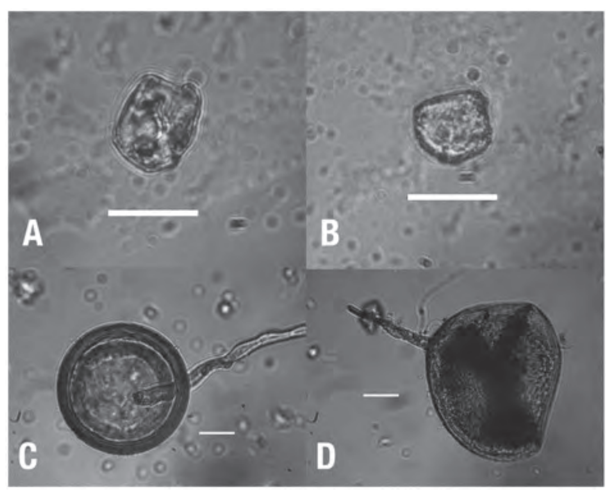

Figure 16. Starch remains and fungal residues from analyzed artifacts. Scale bar is 20 microns in length. A) A damaged grass starch grain; B) A starch grain. Note the heavy surface damage, probably from grinding; C) Fungal residue; D) Fungal residue.

Conclusion

The burned pithouse, Feature 3, at LA 112420 fits a pattern of ritual abandonment and subsequent burning similar to other Developmental period structures in New Mexico. The two stacked slab metates and one-hand mano, atop a projectile point, near the entrance fits the abandonment ritual observed amongst Mimbres pit structures. Second, the collapsed roof had no fill deposits between it and the floor, indicating intentional burning. Third, the presence of mud daubers in the ceiling of the roof indicates an insect infestation. Only one of the four main support postholes contained remnants of burned timbers, with the remaining postholes appearing to have had their posts removed, possibly for recycling. In any case, the ethnographic and archaeological evidence strongly indicates the pithouse at LA 112420 was ritually abandoned and intentionally burned. The absence of human remains in Feature 3 rules out other ritual behaviors concerning deceased individuals and their association with pit structure abandonment (Wells and Brown 2019).

Environmentally, the geomorphology indicates the presence of a nearby small tributary drainage. Based upon the AMS dates and ethnobotanical research, the local vegetation appears to have been dominated by grasses. Collectively the grasses suggest that grassland communities were an important part of the local environment. Maize, wild grasses, herbs, and lagomorphs were the primary components of the occupant's diet. The pithouse was abandoned and burned during the late summer or early fall during which time the mud daubers nest was constructed and packed with spiders. Archaeologically, LA 112430 provides additional important cultural and environmental information for the Early Developmental period in the Albuquerque area (Wells and Brown 2019).

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Bertha Dutton and the Dubious Dating of the Kuaua Murals

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The murals recovered in the "Painted Kiva" (Kiva III) in the south plaza of Kuaua, an Ancestral Pueblo village located on the west bank of the Rio Grande near Bernalillo, New Mexico, are described, illustrated, and explained in detail by Bertha Dutton in the monograph *Sun Father's Way,* published in 1963. Her volume remains to date the only major work published about the site, which was excavated in the 1930s under the general direction of Edgar Lee Hewett as a joint project of the Department of Anthropology and Archaeology of the University of New Mexico (UNM) in Albuquerque as well as the Museum of New Mexico and the School of American Research in Santa Fe, all of which Hewett headed. Dutton, who was an undergraduate in anthropology at UNM in 1934 when the excavations began, went on to become a respected anthropologist, ethnologist, museum director, and author. She was the honoree of the fourth annual volume of the Archaeological Society of New Mexico (ASNM), *Collected Papers in Honor of Bertha Pauline Dutton,* and her obituary in *American Antiquity* (Morris and Olin 1997) occupies several pages, including a lengthy bibliography.

Her dating of the Kuaua murals "chiefly to the 1400s, extending into the 1500s," although rarely questioned, deliberately ignores the report on the ceramics recovered from the fill of the kiva as published by Marjorie Tichy (later Lambert) in 1938, however, which Dutton acknowledges in a footnote but does not directly quote. Tichy's (1938:75) analysis was confirmed in more recent years by Bradly Vierra (1987:8), who does not mention Dutton's proposed dates but states that "Kiva 3 appears to have been built around 1600 and then abandoned during the early 1600s." For reasons to be discussed, I believe Vierra's dates are too late, and Dutton's are certainly too early. Although I continue to admire Bertha Dutton for her achievements as a scholar and author, I have long been puzzled by her ignoring of Tichy's suggested dating of Kiva III's occupation in favor of her own opinion of when it was in use.

Bertha Dutton, Edgar Hewett, and Plans for the Study of the Murals

The biography of Bertha Dutton by a lifelong friend and colleague Vorsila L. Bohrer that is published in the 1979 ASNM volume reads more like an autobiography in the choice of personal detail and tributes to former teachers and mentors.[1] Born in 1903 in Iowa and a sickly child, Dutton started first grade at age seven and attended numerous grade schools and high schools as her father bought and sold farmsteads or held town jobs in Iowa, Nebraska, and Kansas during her girlhood (Bohrer 1979:1-5). She finally graduated from high school in 1923, at the age of 20. With the limited work opportunities available to women at the time, she went on to business school and eventually to employment with the Lincoln Public Schools in Nebraska, where she gained business and administrative experience while recognizing that a future in the business world held little appeal for her (Bohrer 1979:6). During her time with the Lincoln schools, she was also taking evening or early-morning classes at the University of Nebraska, first the required basic courses and then electives in geography and history before a mentor suggested archaeology (Bohrer 1979:7-8). Having learned of the excellence of the program in anthropology offered by Hewett at UNM, she determined to go there. She had been out of high school for nearly ten years when she arrived at UNM in 1932, financed by a settlement for injuries suffered in a traffic accident. The settlement was substantial enough to pay off debts, to buy a Model A Ford, and to cover expenses for her first year at UNM but she needed another source of income to continue. A job as Hewett's departmental secretary became available in 1933, and she was hired (Bohrer 1979:8-9).

In *Sun Father's Way*, Dutton (1963:19-20) mentions visiting—along with other students "engaged in archaeological studies"—the site of Bandelier's Puaray (Santiago Pueblo) in March of 1934, a few days before excavations began there. "Leading the party were Edgar Hewett, Paul A.F. Walter Jr., and Marjorie Ferguson Tichy (Mrs. E. V. Lambert)," Dutton (1963:20) writes, explaining that Hewett's goal for the excavations was to find evidence that the sites of Puaray and Kuaua were locations mentioned by the chroniclers of the Spanish expeditions of the 1500s. The student party did some preliminary surface collecting and survey on that day, but that seems to have been the extent of Dutton's field work at the time. She had already been Hewett's secretary for some months by then, and the field teams consisted of paid laborers supervised by Hewett's graduate students. The excavations were funded in part by the New Mexico Relief Administration (replaced in 1935 by the Works Progress Administration [WPA]), which paid for the labor force. Gordon Vivian supervised the excavation work and Marjorie Tichy, the laboratory (Tichy 1935; Vivian 1935). After the murals were discovered on February 14, 1935 (Vivian 1935:114), Wesley Bliss was placed in charge of the field and laboratory work on the paintings and was responsible for the development and application of the preservation techniques he later described in detail (Bliss 1936, 1948).

Under Bliss's direction, work on the Painted Kiva proceeded carefully. By June of 1935, the north, west, and south walls (where painted mud plaster had remained) had been jacketed in plaster and encased in a wooden framework, cut into three sections, and transported by truck to a laboratory at UNM. Only a badly eroded fragment had remained on the east wall, which had been partially bolstered during the occupation of the kiva by a secondary wall (Bliss 1936,1948; Vivian 1935). In the laboratory, each individual painted layer was photographed, reproduced on canvas in color at full scale, and copied in a reduced scale on graph paper to accompany the notes. Then, in a delicate process, each treated layer of mud plaster was temporarily glued to a piece of muslin and rolled off the remaining layers beneath to be remounted on "commercial pressboard or hard-board" (Bliss 1936:85, 1948:221-222). [2] Most of this work was done by a Mr. and Mrs. Frank Palmer (her first name was apparently not recorded).

An identification system gave a number to each layer of plaster recovered, whether or not signs of paint were found on it. Each plaster layer that supported recognizable imagery was given a letter. Individual entities were further given a figure number in the order that it had been revealed (Dutton 1963:31). The first seven layers of plaster that the Palmers encountered (which were the last seven applied by the kiva's occupants) were found to be sterile; the first painted layer accordingly was labeled A-8 and the individual entities pictured were numbered Figures 1–5. The last layer uncovered that had fragmentary evidence of a painted form was designated Layer Q-59, and 26 layers of sterile plaster were found beneath that, indicating that the kiva had been plastered or replastered 26 times before the first painting was made. In all, 85 layers of plaster been had been applied to the kiva walls and recognizable figures were found on 17 of them. Some of the rest bore evidence of paint but no recognizable images and were not given letters (see Dutton 1963:207 for a concordance of the plaster layers). The adobe altar/deflector also had the remains of painted decoration on several of its "numerous" plaster layers, but most were "only patches of color" (Dutton 1963:32). A second painted kiva, Kiva VI, was discovered in the east plaza as the excavations were ending, but the surviving murals in it were in poor condition. As Dutton (1963:32) reports: "One section of painted plaster had laid *in toto* down onto the floor of the chamber. There water had stood on it for a period of time, so that the paintings were marred by mud cracks. It was impossible to preserve these, though reproductions were made."

The laboratory work on the murals began in December of 1935 and continued for over two years (Bliss 1948:221; Dutton 1963:32-33), with the WPA funds supplemented by a private grant obtained by Frank Hibben (Bliss 1948:221-222;).[3] Dutton (1963 27-32) adds a few details to Bliss's report, stating that "Full-sized copies of the murals were [made] by Indian artists, largely, although some of the painting was done by non-Indians." None of the artists are named, possibly because their names were not recorded. She also notes that "later one-quarter size reproductions were made to facilitate studies of the paintings." These smaller reproductions were to aid in the investigation of the imagery as Hewett envisioned the project.[4]

Dutton (1963:35) explains that Hewett hoped that "informants from each of the Pueblo linguistic groups might be engaged to aid with the study of the Kuaua kiva paintings." These consultants would be older men with ceremonial knowledge and with whom they had "sufficient friendly relationships to make possible the securing of desired information." Dutton had received her BA in 1935 and her MA in 1937; by 1938 she was on the staff of the Museum of New Mexico as Hewett's assistant (Bohrer 1979:10). Hewett, anxious for the project to begin while the elderly consultants were still available, asked Dutton to "initiate the study" (Dutton 1963:35). Accordingly, some of the quarter-scale reproductions were left with a Keres man, and Dutton, with the assistance of Hulda R. Hobbs "to better record the information being derived, particularly to comprehend the Zuni words," set off on her first trip to Zuni in October of 1938, bringing other quarter-scale copies to be discussed with "an old friend and cooperative informant" (later identified as Zna'ote). Dutton (1963:35) reports that this procedure was followed for something over a year, although later the quarter-scale copies, or sometimes the rolled-up canvases, were left with the man for his consideration until he was ready to discuss them. Meanwhile, the Keres consultant had provided "a certain amount of information," but proved unwilling to divulge most of what he knew."[5] "At no time has there been an opportunity," she writes, "to take up this study with Tewa- or Tiwa-speaking informants, nor with the Hopi, which we know would be most rewarding." They were left in the end with only the Zuni interpretations, whatever additional information could be gleaned from the Keres man's very limited cooperation, and research in the ethnological and historical literature.

Although Hewett had believed that a report on the ethnological interpretation of the Kuaua murals would be a suitable subject for Dutton's doctoral dissertation, it was not to be. As Bohrer (1979: 11-14) reports, other opportunities and events intervened, including Dutton's being named Curator of Ethnology at the Museum of New Mexico and assuming responsibility for establishing a new Hall of Ethnology, the opening of which in July 1941 was soon followed by the beginning of World War II. It was not until 1945 when Dutton, on sabbatical leave from the museum, arrived in New York with a complete set of the quarter-scale reproductions ready to pursue a Ph.D. at Columbia University. But even with direct ethnological information only from Zuni, the Kuaua murals were deemed by her committee at Columbia as "too great a scope," and she wrote instead on the Mexican site of Tula, which she had investigated in her graduate school fieldwork (Dutton 1963:36; Morris and Olin 1997:654).

Sometime during 1946, Dutton had been approached by the Girl Scouts of America to organize a series of Archaeological Mobile Camps for Senior Girl Scouts (Bohrer 1979:12). This program evidently appealed to Dutton, who explained in later years that it was because "this was a way she could encourage young women to pursue their own ambitions and not be satisfied simply with the expectations of others" (Morris and Olin 1997:655).[6] The project, however, was an additional drain on her time when she also had a dissertation to write in addition to the duties she resumed with the Museum of New Mexico in the fall of that year. The dissertation was accepted in 1952 (Bohrer 1979:13). The Girl Scout program lasted from 1947 to 1956 or 1957 and had evolved by the time it ended into an archaeological field school at Pueblo Largo in the Galisteo Basin (Bohrer 1979:12; Wilson et al. 2015:5).[7] At the Museum of New Mexico, Dutton was Curator of Ethnology from 1939 to 1959, Curator of Interpretive Exhibits until 1962, and head of the Division of Research until her retirement in 1965. During her tenure with the museum, she wrote numerous articles for its journal, *El Palacio*, as well as editing and rewriting popular books and articles about Southwestern anthropology (Morris and Olin 1997:655). Following her retirement from Museum of New Mexico in 1965 (Figure 1), she went on to become Director of the Museum of Navajo Ceremonial Art in Santa Fe from 1966 to 1975 (Morris and Olin 1997:653).

Dutton's many professional and community responsibilities as well as archaeological research and excavation in Mexico and Guatemala were obviously distractions from finishing the work on the Kuaua murals. As Morris and Olin (1997:654) note, however, "Bertha was too interested in the Kuaua kiva art to let it drop, and she had a particular interest in interpretation of the elements of the murals." In the late 1950s and early 1960s Dutton made a "concerted effort to secure uninterrupted time to complete the manuscript" (Bohrer 1979:14). She was spurred on by the discovery of the Pottery Mound paintings in the 1950s (Hibben 1955, 1960) as well as that of the Awatovi murals, which had been uncovered in Arizona in 1936—just a year after those at Kuaua—and published by Watson Smith (1952) in the comprehensive volume *Kiva Mural Decorations at Awatovi and Kawaika-a with a Survey of Other Wall Paintings in the Pueblo Southwest.* Dutton (1963:37) observes that "there is coming to be a significant amount of material of this nature, and all should be made available for further studies along many lines of research.'' She continues (Dutton 1963:37):

> It is the latter fact which has prompted the publication of the present work, as it is. Rather than hold up the work indefinitely, it seems only fair to make the Kuaua mural paintings available to all such investigators as may have the desire and time to utilize them in any manner.
>
> The author realizes fully that the information is lamentably incomplete and uneven in character. The study makes no pretense of being concluded. Other duties preclude the devotion of more time to the continuance of this undertaking. It could go on for years . . . and should.

The problem with the dating of the Kuaua murals may well be partially attributable to the rush with which the work was completed.

Sun Father's Way: The Kiva Murals of Kuaua

Dutton's monograph, now long out of print, is divided into Books One and Two, with Book One providing the background information for the

Figure 1. Bertha Dutton. The date 1965 is the only additional information available in the photo archives. That is the year she retired from Museum of New Mexico. The book she appears to be signing is the size of *Sun Father's Way*. Courtesy of the Palace of the Governors Photo Archives, Negative Number 030417.

detailed discussion of the murals, "Portrayals from the Past," followed by "Reflections" in Book Two. We know from Book One that Dutton and Hulda Hobbs began visiting the Zuni consultant Zna'ote in October of 1938 and that the project continued for "something over a year." Dutton (1963:35) further reports, "As soon as we obtained information concerning a particular painted layer, we studied the existing ethnological and historical literature, and endeavored to tie in the Kuaua representations with known and recorded observations. She also mentions "doing some further work at Zuni" in the spring of 1945 (Dutton 1963:36). This was presumably in anticipation of her doctoral work at

Columbia during the sabbatical that began in the fall of that year. Ethnology was clearly a major interest in her professional life and that, coupled with the sense of urgency to record the information provided by her elderly consultant while he was still able and willing to share what he knew, suggests that the work of interpreting the Kiva III murals was a very long process.

"The Paintings of Kiva III," which makes up nearly three-quarters of the monograph, is a meticulous description and interpretation of every recognizable fragment recorded on each of the decorated layers. The volume contains only two color plates: the frontispiece showing the personage that Dutton identifies as "Universal Deity: Corn Mother and Sky (Sun) Father," and a two-page spread with cramped reproductions of Layers G26 and D[1]-17 and D-14. The rest of illustrations are in black and white, requiring that colors of every image or fragment be listed from the notes prepared in the laboratory by Mrs. Palmer.[8] Each of the murals covering the three walls from Layers O-43 to A-8 is presented in its entirety to demonstrate the relationship between the images, and each numbered figure is also shown separately in a larger format. Most of the entities were identified by Zna'ote, and his observations are reported along with related information from the ethnographic literature. Dutton always refers to the anthropomorphic figures by the names Zna'ote gave them as sacred personages he recognized in one or another of the storied events in Zuni religious tradition.

Considerable commentary is also included, usually in footnotes, from Edmund J. Ladd, whom Dutton (1963:40, n. 129) identifies as "of the pueblo of Zuñi, graduate of the University of New Mexico (where he majored in anthropology)." Ladd offers translations of Zuni words and additional information about Zuni social and religious customs (insofar as he was free to reveal these) and frequently corrects the reports of the ethnographers. Presumably Ladd provided his commentary sometime shortly after graduation and before he left New Mexico for a career in the National Park Service, probably sometime in the early 1950s.[9] Ladd's comments are also footnoted in the section on Pueblo beliefs and socio-religious organization that Dutton provides as background material in Book One.

The discussion of the paintings from Kiva III is followed by short descriptions of the five fragmentary and poorly preserved figures from Kiva VI. Too little remained to indicate what religious ceremonies might have been portrayed, and there are no comments from Zna'ote or references to the ethnographic literature.

"Reflections," the final chapter, is, appropriately enough, more speculative—and also, it appears, more hurriedly written. Dutton ponders the origins of the people who produced the paintings in Kiva III, suggesting possible Mogollon roots and how these would make a Zuni interpretation appropriate. It is in this chapter that she finally offers the dates "chiefly in the 1400s extending into the 1500s" and gives her reasons (Dutton1963:204). We will return to the issue of her suggested dates after considering material from Book One.

The first chapter of Book One, entitled "The Spaniards Enter the Indian World" outlines what was then known of the historical background, starting with the arrival of the Coronado expedition and its occupation of Tiguex Province—the Spanish name for the Tiwa-speaking pueblos in what is now the Albuquerque area along the Rio Grande—during the winters of 1540–1541 and 1541–1542. Dutton quotes extensively from the chroniclers of the Coronado, Chamuscado-Rodriguez, Espejo, and Oñate expeditions about the people they encountered, their customs, houses, crops, and pottery and, more to the point as it relates to the murals, their clothing and how the men and women wore their hair.

The discovery and preservation of the murals that Dutton relates in the second chapter have already been discussed here, and the background chapters on Pueblo religion and social organization that complete Book One have been mentioned. It is in the first section of the second chapter "Archaeological History of Puaray and Kuaua" that the problem of Dutton's overruling of Tichy's dates arises.

The Dubious Dates and the Coverup

Marjorie Ferguson Tichy, born in 1908, was five years younger than Dutton. She had developed an interest in archaeology in high school and majored in social anthropology in college, graduating in 1930, whereupon she was offered a research-teaching fellowship at UNM (Fox 1976:2). She was teaching there when Dutton arrived in 1932, and as a graduate student was named supervisor of the laboratory at Kuaua in 1934.[10] Her official report on the kivas of Paako and Kuaua was published in 1938 and that on the archaeology of Puaray in 1939 (Tichy 1938, 1939) and were certainly available to Dutton when she was writing *Sun Father's Way.* Tichy's report on the dates of occupation of Kiva III is unequivocal:

> Situated near the junction of the West House and a wing of the dwellings dividing the plazas into North and South Units is a kiva …[that] is one of the most valuable finds of recent excavations.… [B]rilliantly colored paintings upon the plastered walls were noticed. They revealed much of the artistic talents and religious beliefs of the Kuauans, and have been preserved for future study…. Sixty percent of the pottery was culinary, thirty-nine per cent was glaze, and one per cent was Bandelier Black on Grey. In the olla and bowl rim types glaze F was decidedly predominant. The "Soup Plate" appeared, and a square miniature prayer meal bowl shard. In the altar seven shards were removed, five of which were glaze F and two were glaze E. No tree ring specimens were found. This kiva was undoubtedly in use when the Spaniards arrived (Tichy 1938:75).

In the absence of suitable wood for dendrochronology, dating of sites is done by analysis of the ceramic types found. Glaze F is dated 1600-1700, and the "Soup Plate," is a pottery form made by Native potters for Spanish colonists.[11] While the types of ceramics in the fill postdate the actual use of a kiva, the absence or paucity of earlier types indicate a time when its occupation ended. Additional evidence of a late occupation at Kuaua, probably in the south roomblock (Vierra 1987:2) are, as Dutton (1963:32) acknowledges "some examples of glazed pottery from Mexico and a few pieces of majolica ware brought in by the Spanish explorers and early colonists; but all in all, there was very little evidence of Spanish contact at the site, and none whatsoever in the kivas."

Glaze F ceramics "decidedly predominant" in the fill of Kiva III, and five sherds of Glaze F pottery embedded in the adobe altar, are hard to explain away if you want your readers to believe, as Dutton herself evidently did, that the kiva was abandoned in the early 1500s before any Spanish influence could be felt by the muralists. If she is to avoid contradicting the dates she proposes in the "Reflections" chapter, she can't cite Tichy's reports in reviewing the archaeology of Puaray and Kuaua, although—accidentally, or perhaps not—she has a footnote: "See Tichy 1938:72-75" to the basic statement, "Within the two main plazas, five subterranean kivas were excavated, these being of both circular and rectangular form" (Dutton 1963:22, n. 85). That footnote is the last mention of Tichy in the text of the monograph, although the index entry for Tichy reads "See also Lambert" (Marjorie Tichy married E. V. "Jack" Lambert in 1950), and "Mrs. E. V. Lambert" appears in the text about the students' trip to Puaray previously quoted (Dutton 1963:20). On the same page, Dutton summarizes the archaeology of Puaray that had been published by Tichy in 1939 and in a footnote cites "Mrs. Lambert, personal conversation" rather than the publication.[12]

Citing an undated personal communication rather than a publication enables Dutton to paraphrase Tichy's report on the Puaray excavations and to substitute the Pecos glazeware classifications for the Mera classifications that Tichy uses in the publication. She does the same thing in summarizing the archaeology of the Kuaua kivas, for which no reference, published or unpublished, is cited. The kivas are described in a different order from the one Tichy uses, and only the plaza locations, shapes, dimensions, dominant glazewares, and possible dates of use are offered—and not consistently—for each kiva. This may all be original writing by Dutton, but she doesn't cite a source, and the information had to have come ultimately from Tichy. Tichy's published report on Kiva III was quoted near the beginning of this section. Dutton's (1963:23) full statement about the same kiva is very brief: "A smaller kiva (III)—18' square—located a short distance to the southwest from the above-mentioned rectangular chamber [another kiva in the same plaza] contained 16th century fill. On its walls were ceremonial paintings. This will be discussed more fully further on." She does, as we know, discuss the paintings and their interpretation in detail, but there is no more about the archaeology. Tichy does not mention sixteenth-century-type Glaze E in the Kiva III fill. What Tichy does state is that Glaze F—a *seventeenth* century type—was "decidedly predominant." And she adds that of the seven sherds removed from the altar "five were glaze F, and two were glaze E" (Tichy 1938:75).

Dutton (1963:32) gets around the problem of the glaze F sherds in the adobe of the altar by acknowledging them and then assigning them to the wrong century: "The potsherds from the altar were identifiable as being of Glaze V and Glaze VI types, which would suggest 16th century construction for this feature." Confusing the l600s with the sixteenth century can be an honest mistake, but it is used twice to get around inconvenient dates, along with switching to the older Pecos classification system from the Mera system that Tichy uses, and other instances where she avoids giving the correct dates for glaze F.[13]

Why does Dutton override and obfuscate Tichy's published dates for Kiva III? I would propose, as already suggested, that she wanted to believe that the expression of ancient Pueblo religious beliefs and the ceremonies she found in the murals could not have been tainted by European influences. She writes her arguments in the "Reflections" chapter as if this were the case. She does not offer dates for the paintings until the last few pages of Book Two, following a lengthy review of the culture history and religious development of the Pueblo Southwest. she outlines the possible history of the occupation of Kuaua from the early 1300s but in terms of Pueblo religious organizations that she derives from the information Zna'ote had provided her and from her research.

In two paragraphs that betray both her wishful thinking about the early date of the Kuaua paintings and her failure to check facts in the haste to complete the book, she describes the end of the occupation of Kiva III:

> After about one hundred years, with some seventy-five evidencing folk history painted on the walls, Kiva III was abandoned. From the ceramic record, this chamber was filled with refuse during the 1500s, which indicates that it was abandoned while other portions of the pueblo were still occupied. If my suggestion that the site was abandoned between 1573 and 1593 is correct, Kiva III must relate to a period around the turn of the 16th century, which would denote that the paintings we have from Kiva III refer chiefly to the 1400s, extending into the 1500s.

> From historical accounts of the attire of the peoples of the Rio Grande pueblos, with particular reference to their painted and colorfully embroidered garments, it is apparent that the individuals portrayed in the paintings in Kiva III were earlier and more simply clad than those who were seen by the earliest Spaniards and thus before 1540. The practice of elaborately decking out the deific ones is ancient, and it is beyond doubt that that the artists who depicted their folk history at Kuaua would have shown the finest garments and ornaments with their representations of the Divine. The Kuaua paintings are clear portrayals of folk history without exuberance. They would seem to represent a relatively unadorned concept, earlier than the Awatovi paintings and those of Pottery Mound… From these observations, it would seem that the Kiva III representations at Kuaua fit best in the 1400s and reflect cultural practices of that period (Dutton 1963:204-205).

Dutton repeats here the same wrong dates for Glaze F that we saw in the account of the archaeology of Kuaua in her section on the archaeology of Kuaua. It is not clear why she places the date of the abandonment of Kuaua specifically between 1573 and 1593. Is it because it sounds more factual than round numbers would? The dates, in any case, are well before 1600, the usual date given for the appearance of Glaze F, the type that Tichy reported "decidedly predominant" in the fill of Kiva III. Dutton then assigns a passage she quoted in the first chapter to the wrong expedition and follows that with a mistaken assumption:

In her first chapter, Dutton (1963:6-7) quotes Casteñada, the chronicler of the Coronado expedition that arrived in 1540, Jaramillo, "another member of the expedition," and Coronado himself, but none of them describes the clothing of the people they encountered. The statement about "painted and colorfully embroidered garments" comes from Gallegos, the scribe of the Chamuscado-Rodriguez expedition of 1581, whom Dutton (1963:8-9) quotes at length. About colorful clothing he writes:

> Some adorn themselves with painted cotton pieces of cloth three spans long and two thirds wide, with which they cover their privy parts. Over this they wear, fastened at the shoulders, a blanket of the same material, painted with many figures and colors. It reaches to their knees, like the clothes of the Mexicans. Some, in fact most of them, wear cotton shirts, hand painted and embroidered, that are very charming. They wear shoes. Below the waist the women wear cotton skirts, colored and embroidered, and above a blanket of the same material, painted and worked like those used by the men (Dutton 1963:7-8, citing Hammond and Rey 1927:26-28).

While colorful clothing, usually in the form of brightly decorated kilts, may be seen in the murals of Pottery Mound, Awatovi, or Kawaika'a (see Crotty 1995, 2007; Hibben 1975; Smith 1952; Webster 2007) none of the figures are attired in blankets reaching the knees "like the clothes of the Mexicans." Some kind of shirt, sometimes embroidered, is seen more often at the other sites than at Kuaua, but there is no reason to assume, as Dutton does, that less colorful clothing is earlier. It is, in fact, later at Awatovi, which she could have seen from a perusal of Smith's illustrations, comparing, for example, Smith's Figures 67 and 80. In any event, familiarity with Smith's 1952 monograph would have reminded her that the earliest Awatovi murals are no later than the early 1400s—and perhaps earlier—and no colorfully dressed anthropomorphic beings are to be seen in those. The earliest Pottery Mound murals probably also date to the 1400s, but only a few illustrations in two journal articles (Hibben 1955, 1960) were available to her (Hibben's monograph was published in 1975).

Perhaps because of her desire to find in the Kuaua murals Pueblo religious belief untainted by European contact, she fails to consider other possible reasons for the relatively restrained dress of the figures portrayed. It could be something as frivolous as fashion, or it could be that that, contrary to her expectations, "elaborately decking out the deific ones" was not seen as appropriate by the artists. Or it could be a more somber reaction to something as devastating as a siege by Spanish troops wintering nearby.

The Historical Context and Proposed Alternate Dates

Recent investigations undertaken at Kuaua have established that, contrary to the findings of the 1930s excavations, the pueblo was indeed besieged by Coronado's troops in the Tiguex War (1540-1542), although it was neither Coronado's main camp site nor the site of a prolonged siege mentioned in the Spanish records (Mathers 2020, see also Mathers this volume). Metal-detector investigations, still ongoing in 2020, have uncovered evidence of mail armor, plate armor, buckles, lead shot, and copper crossbow quarrels, mostly outside the south, west, and north walls, with answering Pueblo projectile points and sling stones as well as evidence of close combat in roughly the same locations. (Mathers 2020:178, Table 1, Figure 3). Historical records indicate that about 100 women and children were taken captive (Mathers 2020:179, Table 1, citing Flint and Flint 2005:409). Because the excavations of the 1930s had found no evidence of Spanish military objects, Dutton cannot be faulted for believing, like everyone else, that Kuaua had not been much affected by Coronado's entrada, but the new knowledge provides a date before which it is extremely unlikely that the Kuaua murals Dutton describes could have been painted.

The traumatic experiences of warfare, the casualties among the warriors, and the taking of prisoners might well have resulted in the depopulation of the pueblo for a time. Perhaps a new group moved in sometime after 1542 and built Kiva III—or rebuilt it if it had existed before the battle.[14] In any case, we know it was some time before the extant mural cycle was initiated. Twenty-six layers of undecorated plaster were found beneath Layer Q-59, the last layer the Palmers recovered that showed signs of paint. It is not known how much time elapsed between plaster layers at any of the painted kiva sites. Dutton (1963:204) assumes an annual replastering in suggesting that Kiva III was occupied for about 100 years, but there is no regularity in the number of plaster layers, if any, between the paintings on layers O-43 to A-8.

To someone looking at the murals for what is visually apparent rather than for what the depictions might signify, the style of the paintings is noticeably similar in the first group of layers with recognizable figures, O-43 to G-26, suggesting that they could have been made by the same skilled artist or group of artists. The anthropomorphic figures are depicted frontally except for the feet, which are seen in profile and pointed in the same direction, as is typical of Ancestral Pueblo mural art of the period. Most wear plain black kilts, or skirts, with perhaps a touch of red at the hem, and are bare-chested, even those whose hair whorls indicate they represent females, although breasts are not indicated. A human-bird composite being shown in profile and Dutton's "Universal Deity," who wears a wide tunic rather than a kilt, and whose mask is seen in profile, are exceptions in pose and dress. Sashes at the waist, many with an edging of tinklers hanging down over the kilt, are shown with four tasseled and embroidered ends conspicuously flared in defiance of gravity—a convention seen also at the other Ancestral Pueblo painted kiva sites that may signify the deific status of the personages represented. Animals are shown in profile. Unique to Kuaua are sprays of water or seeds, often accompanied by lightning, and seen in most layers. The sprays issue from ollas or from orifices of various animals or descend like rain from stepped pyramid "cloud altars." These images are rendered in a uniform scale, and the compositions seem static and balanced.

Beginning with Layer F-23, the lower edge of the painted area no longer serves as the ground line for the anthropomorphic figures, and by Layer E-19 the torsos of the anthropomorphic figures are subtly elongated and their scale is no longer uniform. By Layer B-9, two anthropomorphic figures are seen in profile view, and two others in three-quarter view. The hair whorls of a female figure seem to be coming undone. There is a sense of movement instead of stability, and the execution of the work is progressively less skilled. The final painted layer, A-8, was applied directly onto the previous layer, and a white-bodied and unclad anthropomorphic figure wearing an outsize mask is shown with bent knees and feet pointing outward, an unusual pose for Ancestral Pueblo art, but similar to the figures portrayed a mid-seventeenth century mural from Gran Quivira, the southernmost of the Salinas pueblos.[15] The changes in the art style and the declining proficiency of the artists may reflect events taking place in the real world: the arrival of the Chamuscado-Rodriguez expedition in 1581 and/or that of Oñate in 1598. Seven layers of undecorated plaster were applied to the walls before the kiva went out of use, either with the arrival of one of the entradas or sometime in the early 1600s, as Vierra suggests. I disagree with Vierra's suggested building date of 1600, however, as it would require that all the murals be painted after the disruptions associated with the arrival of Spanish colonists. The high level of artistic skill of the first group of paintings suggests an economy that allowed for some degree of crafts specialization that could not have been maintained under colonial circumstances, nor is it likely that some 85 new coats of plaster would be applied in the course of 30 years or so. A building date of around 1545 seems more reasonable.

Little is known about Kiva VI in the east plaza, which was excavated after Tichy's 1938 report. Franklin (2019:12, citing Akins and Hannaford 2005), suggests that at least a portion of east plaza was built relatively late, perhaps around 1500. This would be much earlier than I would expect for Kiva VI, given the sequence of murals in Kiva III and the style of the remaining five fragments. As previously noted, they were in such poor condition that they could not be preserved, but only copied. Dutton (1963:189) says of them: "It is perhaps unfair to compare these small fragments with the many depictions from Kiva III, but one cannot help but feel that the paintings of Kiva VI lack the purity of those of the other portrayals, and that they are later in time, evidencing greater exuberance." Four of them seem to be the work of unskilled artists, and three of these exhibit the awkwardly bent knees and outwardly pointing feet (one lacks feet) noted in a single figure from the last mural of Kiva III. The fifth fragment seems to be a somewhat more competent depiction of a bicolored nude in three-quarter view vaguely reminiscent of a bicolored nude figure in Kiva III's Layer D-14. Less is known about the east plaza area than other parts Kuaua Pueblo, as there is no official report from the 1930s excavations, and it appears from the map provided by Franklin (2019:Figure 3) that it was not tested in the 2017 investigations at the site. Judging from the internal evidence of the paintings alone, the extant fragments in Kiva VI probably date to about the same time or slightly later than the latest of the Kiva III paintings, followed by abandonment of the kiva.

Conclusions

Dutton's career in anthropology was primarily as an ethnologist and museologist; in addition to the museum exhibits, she was involved in outreach programs and writing popular literature. Placing the murals in their historical context was not a matter of importance to her, as it is to me, as an art historian. Her alterations to Tichy's report on the ceramics in the fill of Kiva III are not, in my view, a grave ethical lapse, although her suggested dates distort the historical context. Perhaps the manipulation of the dates was an expedient way to hide the conflicting evidence after she had completed her final chapter and could give no more time to rewriting it. Whether intentional or not, she did leave the reference to the report in a footnote. What is really important is that she made the time in a busy work schedule to bring the Kuaua murals to light in a publication where their artistry and ethnological content can be appreciated by anthropologists and the general public—and studied along with the murals of Awatovi, Pottery Mound, and Gran Qivira by a finicky art historian who wants to see them situated in their proper historical context.

Postscript

For anyone interested in kiva mural art produced during the period of its florescence from about 1300 to 1600, the Coronado State Historic Site offers two unusual opportunities to experience the Kuaua paintings. The first is to descend the ladder into the restored Kiva III and be surrounded by replicas of the original murals on its walls. The artist—who is never named by Dutton—was Ma-Pe-Wi (Velino Shije Herrera), of Zia, one of the young Pueblo artists that J. J. Brody (1971:85) refers to as the "self-taught painters" sponsored by Edgar Lee Hewett, who promoted the sale of their work and gave them jobs at the Museum of New Mexico or the School of American Research in the 1920s. Ma-Pe-Wi had been encouraged to develop his artistic talents as an extracurricular activity while he was a student at the Santa Fe Indian School from around 1918 (Brody 1971:102). He was well established as an artist proficient in a variety of media by the time Hewett chose him to replicate the murals in true fresco. Imagery from Layer G-26 was painted on the north, west, and south walls, and Layer N-41 on the east wall, where the plaster had been lost during the time the kiva was in use. The "Painted Kiva" was rebuilt and the replicas frescoed and ready for visitors on the day that Coronado State Monument, as it was then called, was dedicated in 1940.

Over the years since then, the frescoes were damaged by moisture, vandalism, and amateur touchups with house paint, and in the early 2000s, the kiva had to be closed to the public because of continuing vandalism. James Conder, one of the founders of the Friends of Coronado State Monument and its president 2003–2016, worked tirelessly to raise the funds needed to repair leaks and drainage problems that threatened the frescoes. Under his leadership, funds were raised to bring professional art conservator Constance S. Silver to Kuaua to treat the paintings and restore them as much as possible to their original condition, a two-season project that was completed in August of 2013. The kiva was reopened that year to visitors on guided docent tours.

The second unusual opportunity to experience the Kuaua murals at the Coronado Site is in the Mural Room of the Visitor Center, where fourteen of the original paintings are exhibited in a quiet and softly-lit space where the murals may be respectfully viewed. Among them is a rabbit (Figure 2) from Layer E-19. Others panels include several of the figures from Layers G-46 and N-41 that Ma-Pe-Wi replicated in the restored kiva. Nowhere else in the world is it possible to see panels of protohistoric Pueblo art in a pleasant and appropriate setting.[17] It's well worth a trip.

Figure 2. Original mural painting of a rabbit from Layer E-19, Kiva III, Kuaua. One of fourteen original paintings from various layers of the Kiva III murals exhibited in the Mural Room at Coronado State Historic Site Visitor Center. Courtesy of New Mexico Historic Sites.

Notes

1. Among the personal reminiscences that Bohrer includes is an example of Dutton's "can do" attitude when, as a young woman, she took on a man's job of driving a six-horse team to operate a corn binder during the year that she served as her father's farmhand and helper early in the Great Depression.

2. Although Bliss mentions photographs, none to my knowledge have been located to date in the Kuaua collections curated in Santa Fe. The wide full-scale oil-on-canvas reproductions, which included the figures from all three walls in their relative positions, were never mounted but left rolled up. As a result, they cannot now be unrolled without costly conservation work.

Of the original paintings mounted on hardboard, Dutton (1963:33) reports that one panel was displayed for a time in the anthropology department at University of New Mexico and the rest, along with the scale drawings and canvas rolls, were sent to the Museum of New Mexico in Santa Fe, where more storage space was available. Fourteen are now exhibited in the Mural Room of the Visitor Center at Coronado State Historic Site.

Kiva III was reconstructed at the site, and Ma-Pe-Wi (Velino Herrera), one of the Native American artists who had worked on the canvas copies, reproduced murals from two of the layers on the walls of the restored kiva.

3. Frank Hibben has been criticized for failing to preserve the murals of Pottery Mound. He deserves credit for his fund-raising efforts in the 1930s on behalf of preservation of the Kuaua murals, a much more feasible, though still costly, project than would have been the case at Pottery Mound with its 17 painted kivas.

4. The quarter-scale copies have also disappeared so far as I know. When I interviewed Bertha Dutton in the early 1980s, she showed me one from Kiva VI and said it was the last (or so I recall, but my memory of that day is hazy).

5. In a footnote, Dutton (1963:35) remarks, "Later, he died, taking his knowledge to the grave rather than reveal it to the uninitiated." Many early anthropologists and ethnologists believed that Native American culture was dying, and some seem to have assumed that knowledgeable members of the various Native groups would want to share their interest in preserving its details, including sacred religious knowledge withheld from most of their own people.

See Dutton 1976, "A Sand Painting for Praying." for what seems to be a typical attitude of ethnologists—or at any rate those involved with museum exhibits—of her time. In this case, she was acquiring from an elderly Navajo singer "genuine" sandpaintings as well as painted copies of them for the Museum of New Mexico's Hall of Ethnology in 1940. "He appreciated the fact that certain non-Indian students and researchers were truly concerned with the preservation of Navajo wisdom and its manifestations through all aspects of their culture" (Dutton 1976:242).

6. Vorsilia Bohrer, a former Scout and one of "Dutton's Dirty Diggers," became a professional archaeologist and ethnobotanist. Morris and Olin (1997:5655) note that many of these women went on to attain advanced degrees in diverse fields of study.

7. Bohrer says the Girl Scout program lasted from 1947 through 1957, including the work at Pueblo Largo, but Wilson et al., working from archived material, write that the Pueblo Largo work ended sooner, stating that "Dutton excavated portions of Pueblo Largo from 1951 to 1956, when the ranch on which Largo was located changed hands and new owners prohibited further work." The matter may be resolved in *Dutton's Dirty Diggers: Bertha P. Dutton and the Senior Girl Scout Archaeological Camps in the American Southwest, 1947–1957*, by Catherine S. Fowler, University of Utah Press, due to be released in November 2020, but not available at the time of writing.

8. Dutton (1963:viii) acknowledges photographer Tyler Dingee, who "made painstaking black and white reproductions of the murals portrayed in this publication, and duplicated the color work with great exactness." Presumably Dingee's photographs were made from the canvas rolls and were not the photographs taken during the progress of the preservation work.

9. Dutton was more fortunate than she knew to have had the assistance of Edmund Ladd, who was uniquely qualified, even as a recent graduate. Ladd went on to a distinguished career, first as archaeologist for the National Park Service in Hawai'i and later as Curator of Ethnology at Museum of New Mexico and author (Anonymous 2020).

10. Edgar Hewett actively encouraged women to study anthropology and helped his students, both male and female, to find jobs in the field, no small benefit in the years of the Great Depression. Marjorie Tichy was reassigned from Kuaua to direct another of Hewett's excavations at Paa-ko, and by 1937 she was employed by Hewett at the Museum of New Mexico (where Dutton was already serving as Director's Assistant). Tichy became Curator of Archaeology in 1938, the same year that Dutton was named Curator of Ethnology (Bohrer 1979:10; Fox 1978:3). Dorothy Luhrs, another of Hewett's graduate students, worked as a supervisor at Kuaua after Tichy went to Paa-ko. When the WPA project at Kuaua abruptly ended in January 1939, her

employment was shifted to Personnel Supervisor with the WPA Museum Project, but she seems never to have been employed by Hewett at the Museum of New Mexico. See Ellis (2020).

11. A Spanish Colonial hacienda located just a half mile south of the Kuaua site (Franklin 2019:25), but probably unknown to Dutton, may have been the destination of pottery like the soup plate produced and discarded by late occupants of the Kuaua site.

12. Another footnote reference to "Mrs. Lambert" is found on page 167 and concerns Mimbres pottery. Two more on pages 200 and 201 cite "Mrs. Lambert" for the types of artifacts recovered from Kuaua, a complete inventory of which "was not available." Neither footnote states how the information was conveyed.

13. In her discussion of the ceramics from the circular Kiva II, also in the south plaza, Dutton (1963:23) actually supplies a later date but mistakenly assigns it to Glaze E. "Glaze V or E (1500-1680 or, here, until abandonment of the site)." Further confusing the reader, two footnotes, 88 and 89, explain that Mera's glaze D, E, and F equate with glazes III-IV, IV-V, and VI of the Pecos classification of Kidder and Shepard, but Dutton never gives a specific date for glaze F.

14. Dutton (1963:205) notes that Bliss (1948:222) reports finding a set of laminated layers near the floor of the kiva "when excavations were made to jacket the base of the mural layers" and suggests the possibility that these were "remnants from a set of old mural layers that had been largely destroyed before new layers were placed over them."

15. See Peckham (1981:26-28). Part of the mural is illustrated in color as the frontispiece of Hayes et al. (1981).

16. The Museum of Northern Arizona has one original fragment from Awatovi on permanent display in the archaeology gallery and three other fragments can be viewed in the Collections Center with prior arrangements.

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Rio Grande Glazeware Paint and Slip Enigmas: The Role of Pottery Firing

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The term glazeware refers to a series of pottery types produced during the Classic (or Pueblo IV) period in New Mexico and Arizona. The brightly colored bichrome and polychrome pottery manufactured by native Pueblo communities along the Rio Grande and its tributaries is commonly known as the Rio Grande Glazeware series. As a continuous ceramic tradition, glazewares were produced across most of north central New Mexico and northeastern Arizona from about 1300 to 1700.

The subject of the technology, distribution, and "rise and fall" through time of the glazeware series has been a source of fascination for Southwestern archaeologists from the beginning of scientific studies in the area; Anna O. Shepard (Kidder and Shepard 1936) and Harry Mera (1933, 1940) among others were involved with revealing the basic chronological, distributional, and technical facets of glazeware pottery. Although much study has been devoted to this subject since that time, there are still blanks in our knowledge. Most obviously, the biggest hurdle in deciphering the mysteries of the glazeware technology is that these brightly colored vessels with shiny black glazed paints are no longer being produced in any of the modern Pueblos, and no reliable accounts describe in detail the materials and steps involved in producing what is now a "lost art."

Normally well-made and with bright slips and reflective black glazed painted lines, this tradition yielded some outstanding and artistic ceramic vessels during Glaze periods A (1300-1425), B (1425-1450), and C (1450-1500). However, the later glazes suffered from increasingly runny and discolored paint, as well as dull and clouded slips. The later glaze types are especially prone to these problems and they seem to have become worse through time, starting sporadically as early as Glaze C, increasing in D (1500-1530), and especially during Glazes E (1530-1575), E-F (1575-1600), and F (1600-1680 or 1700). (These dates are approximate and some overlap between styles always occurs as this was a continuum).

The late glaze paint is often discolored, appearing as green, brown, bubbly, and runny.

After several centuries of success, the well-controlled black glaze of Glaze A deteriorated increasingly during Glaze D, E, and F periods. At the same time, the slip colors, originally bright orange, red, yellow, buff, and white, became darker, dull, and faded. These changes were widespread, affecting the entire geographic range of Rio Grande Glazeware production at about the same time. What caused this? Archaeologists have proposed various possible reasons, including a) changes in mineralogical composition and geological sources of glazed paint, b) alterations in paint preparation methods and processes, and c) influences from Spanish exploration and conquest of the Pueblos of New Mexico.

This paper proposes an additional potential source of trouble, the firing process. Normally at the end of the pottery production sequence, firing is a critical yet accident-prone step, which may have caused problems for glazeware potters. Although consistency and/or variation in glaze paint composition has been extensively studied by archaeologists in recent years, the cumulative and variable effects of open-air pottery firing on glaze pigments have not been thoroughly addressed. This paper uses kiln refiring and X-ray fluorescence (XRF) testing of paint compositions on a chronological sample from the Chamisal site in the Albuquerque district to evaluate potential effects of firing practices on the paints and slips. The hypothesis and preliminary results explored here do not necessarily invalidate other possible causes, but they add evidence for a different variable—the practices and pitfalls surrounding Pueblo firing practices. Accordingly, this paper includes elemental analysis of glaze paints from a Classic period site along the river in the Middle Rio Grande Valley, a zone not well studied previously. Techniques included kiln oxidation (refiring), and elemental analysis of glaze paints by XRF methods.

Previous Thoughts on Issues of Glazeware Production

This paper will not attempt to review the extensive literature on the subject of Rio Grande Glazeware technology, as it has been an ongoing subject of study for many years. Some trends can be mentioned to give perspective on the problem. Production of glaze-painted pottery was widespread in the Southwest, from White Mountain Redwares in the south to San Juan Redwares in the north, and from Pecos Pueblo on the northeast, southeast to the Salinas Pueblos, and to Acoma and Zuni on the west, obviously a vast region. Most archaeologists believe that the Rio Grande glazes, at least, originated in the polychrome ceramics of the White Mountain Redware in the area of the Little Colorado river area of Arizona during the late 1200s.

Studies of designs and attention to pastes and tempers began early in scientific Southwestern archaeology. Indeed, the fascination with Rio Grande Glazeware started with some of the earliest scientific explorations in the region. The collaboration of Kidder and Anna O. Shepard in the 1930s at Pecos Pueblo produced detailed studies of the ceramics including attention to defining "types" with associated descriptions and their stratigraphic and chronological evolutions that set a high standard for all subsequent studies (Kidder and Shepard 1936). Commencing with detailed studies of all aspects of the pottery of Pecos Pueblo, Kidder and Shepard described the stratigraphic changes in glazeware morphology and technology and founded the chronological framework on which future temporal refinements would be based.

In a series of papers based on regional survey and seriation, Harry Mera (1933, 1940) succeeded in plotting the basic temporal and spatial extent of the northern Rio Grande glazeware series, and his chronological sequence remains the main framework in use today. The Eighth Ceramic Conference, in 1966, codified and described the pottery type names used today (Honea 1966). Modern descriptions with illustrations are provided by Dyer (2008).

Early studies by Shepard and others soon recognized the validity of using lithic tempering materials in locating geological origins of exposures utilized by prehistoric potters. The almost universal utilization of local rock-based tempering materials across the region permitted the assignment of manufacturing origins via study of lithic tempers by microscopic examination. This in turn would help identify the ceramic production of specific "districts" or at least close groups of prehistoric communities. Shepard's early work at Pecos and then the Jemez pueblo of Unshagi (1938) were landmark studies that not only revealed the tempers and pastes of the local sites' pottery but set a sound foundation of theory and method for all future students. Among other results, Shepard noted the increased runniness of the later glazes and determined that the later ones at Pecos had a higher percentage of lead in the paint (Kidder and Shepard 1936:531). She also identified the Cerrillos Hills, an historic mining district, as a probable source of prehistoric galena and other mineral ores utilized by the Pueblos. After all, one of the main products from Cerrillos, turquoise, had been sought there by the Pueblos for centuries.

Recognizing the need for broader regional comparisons of glazewares in terms of dates of manufacture, tempering materials, and paint composition, Shepard undertook a pilot regional study of Rio Grande Glazeware (1942). Realizing that the dataset of the time was incomplete in many districts, she relied on her analysis data from Pecos Pueblo, Unshagi, and a brief study of glazewares at Kuaua. Sporadic reporting was available from other districts, but at the time data were quite uneven. Indeed, in this early study of regional variation in temper usage, Shepard relied heavily on museum sherd collections for her data on the Middle Rio Grande Valley sites (Shepard 1942:134). At the time, data from sites south of Bernalillo in the Albuquerque area were poorly known. Site locations were not well recorded, and ceramic data for Classic period sites the south were viewed only through available sherds stored at the museum collections in Santa Fe. Middle Rio Grande data were so incomplete in that era that in distributional tables and graphs, the Albuquerque area is only seen as having early glazes (“Glaze I Red”, or Glaze A) tempered with potsherd (Shepard 1942:143).

Although modern urban development has eradicated almost all vestiges of the approximately 16 major Classic pueblos that once thrived in the Middle Rio Grande between the South Valley and Bernalillo, fortunately there are places where the archaeological past is still visible. Today that almost empty map area along the Rio Grande has been filled by more recent investigations, including extensive work at Pottery Mound to the west on the middle Rio Puerco to the west, and to the east at Tijeras Pueblo in the East Mountains. Along the main river itself, that blank area now contains several more “dots,” including investigations at (going from south to north): Abeytas Pueblo (Eckert and Snow 2015), Valencia Pueblo (Franklin 1997), Old Isleta (Marshall 2021), Piedras Marcadas (Franklin 2017; Schmader 2016), Montaño Bridge (Franklin 2010; Schleher 2010a), Alameda (Kurota 2008, 2013), Chamisal (Franklin 2012), and Kuaua (Franklin 2019). These are major Classic period pueblos, and surveys have located many earlier villages from late Developmental through Coalition periods. Environmental data and geologic maps now permit locating of ceramic raw materials.

As she was aware of the geographic gaps in current knowledge of the time, Shepard (1942) used “Rio Grande Glaze Paint Ware” mainly as demonstration of the research validity of regional, spatial comparisons. As such, she set a firm theoretical foundation for comparative studies across the broad range of glazeware manufacture. Technological assessment of glaze paint compositions was undertaken, stressing the need for specific “quantitative” assessment of paint composition at the elemental level, rather than grosser level “qualitative” results. She therefore conducted two kinds of tests to look at spatial differences in paint across the region. The first was a “spectrographic” test on 119 samples. The second was a “microchemical” analysis (Shepard 1942:214). Together, these tests revealed a great variation in the relative amounts of the principal elements comprising the lead paint from distinct locales. Geographically, these varied substantially across the region from the Little Colorado to Pecos Pueblo. This in turn implied differential mining locations in other areas, or possible variations in the preparation of paint pigments (Shepard 1942:224). It did appear to Shepard that increased pigment problems in later glaze types were the result of increased percentage of lead in the paint, at least at Pecos Pueblo.

Nevertheless, the cautious scientist Anna Shepard hesitated to draw firm regional conclusions about these preliminary results, as the data were incomplete ceramically (and geologically) in many of the districts that had yielded glazeware samples. In her own assessment, she stated, "I have drawn no conclusions regarding the history of glaze paint from these analyses…" (Shepard 1942: 224). But the direction of future research was now made clear, and her insistence on detailed quantitative testing of paint compositions was to influence much of the work of later archaeological investigation of the glazeware ceramics. Indeed, her work paved the way.

Somewhat later, Shepard compiled much of her accumulated theory and practice into a handbook, *Ceramics for the Archaeologist* in 1957, eventually being reprinted eight times (Shepard 1965a, used herein). A separate summary of her petrographic work with the glazed series appeared in *Ceramics and Man* (Shepard 1965b). Her observations regarding the effects of firing on vessel surfaces are mentioned below, as they relate to the subject of this paper.

During the 1960s and 1970s, Helene Warren carried out detailed analyses of lithic tempering materials on glazewares at a number of sites, including Cochiti reservoir (Warren 1979), at Tonque Pueblo (Warren 1969), and Tijeras Pueblo (Warren 1980). At many locations, she was able to match glazed and other ware rock tempers to known local geologic resources, and thus determine which wares were locally made versus imported in site assemblages. She also concluded that at some sites, for instance at Tonque, communities of potters produced wares beyond necessary local utilization, and thus probably specialized in ceramics for distribution.

It was not until about 2000 that further breakthroughs were achieved in the sourcing of glaze paint materials. Initially this was achieved by Judith Habicht-Mauche, whose analysis of glaze paints from Tijeras Pueblo and elsewhere illustrated that specific identification of glazed paint origins could be achieved. With analysis of lead isotopes, as a significant variable, it was now possible to identify geographical and geological source areas for lead-based pigments. Mining districts in the Cerrillos Hills and in southern mining districts at Magdalena and Hansonburg could now be matched against corresponding glazed ceramics (Habicht-Mauche et al. 2000, 2002, 2013). Collected papers on these new research developments were published in *The Social Life of Pots* (Habicht-Mauche et al. 2006). In this volume, a comprehensive review of Rio Grande Glazeware developmental history is provided by Eckert.

Additional articles on a wide variety of topics relating to the general subject of glazeware are provided by other researchers. Regionally, topics ranged geographically from The Little Colorado White Mountain Redware zone to Zuni, Salinas pueblos, Middle Rio Grande pueblos, Galisteo Basin towns, and Pecos Pueblo on the north. New studies expanded the investigation of glazed paint composition, employing new testing methods pioneered by Habicht-Mauche and others (Herhan 2006; Huntley et al. 2007). Using this base of new evidence of spatially distinct mineralogical origins, archaeologists could now trace how traditional "recipes" of paint preparation were transmitted along with lead-based pigments across the region (Nelson and Habicht-Mauche 2006). In turn this led to reconstructions of the cultural processes of initial acquisition of technology, mining of raw materials, distribution, and application of glaze paints across the Puebloan landscape. Social contexts of ceramic learning and transmission of knowledge, techniques and designs across a vast region were also considered by the contributors.

More recently, expanding research horizons resulted in a new compiled volume, *Potters and Communities of Practice: Glaze Paint and Polychrome Pottery in the American Southwest, A.D. 1250-1700* (Cordell and Habicht-Mauche 2012). In this sequel, researchers on glazeware technology continued to expand understanding of the glazeware phenomenon. The advent of newer, nondestructive techniques from the "hard" sciences such as instrumental neutron activation analysis and XRF boosted the ability to test glaze paints quickly and inexpensively. Now, batches could be compared across the glazeware distribution, from the White Mt. Redwares to Zuni to the Rio Grande and the Galisteo Basin. With new techniques, direct analysis of pigments allowed evaluation of differences in paint chemical composition and origins of recipes across a wide region. Samples could now be compared to potential known sources. For instance, Schleher and colleagues (2012:103) evaluated paint chemical composition at San Marcos, finding it to be very consistent through time in the dominance of lead, probably always obtained from the nearby Cerrillos mines. Confirmation of lead ores from the Cerrillos mines found in paint on sherds elsewhere, such as on the Pajarito Plateau (Curewitz and Goff 2012), substantiates Shepard's earlier supposition that this was the source for lead paints at Pecos. Given knowledge of points of manufacture, the extent of trade and exchange of finished glazeware could be evaluated. In addition, the new research focus also now broadened into reconstructing the social/cultural frameworks and especially the "communities of practice" within which potters learned, practiced, and taught the traditional knowledge related to pottery making methods according to Puebloan social institutions (Huntley et al. 2012). Furthermore, new replication experiments (such as Blinman et al. 2012) have opened the door to an understanding of how the late glazes were made.

Subsequently, a third collection of papers, *Landscapes of Social transformation in the Salinas Province and the Eastern Pueblo World*, focused on the Salinas pueblos of Gran Quivira, Abo, Tenabo and Quarai (Spielmann 2017). A wide-ranging group of articles centers on the history and prehistory of the Salinas Province; those by Capone, Clark, and Herhan and Huntley deal with aspects of glazeware manufacture and distribution. Herhan and Huntley specifically address the problem of sourcing glazeware and other pottery to particular towns in the Salinas district, a topic of long-standing archaeological interest at the Salinas Pueblos. In following up their earlier investigations, Herhan and Huntley (2017:203-225) included detailed petrographic analysis of rock tempers, yielding convincing data on sourcing ceramics to specific manufacturing centers in the Salinas region.

More recently, studies of Classic period glazes at Tonque, on the Pajarito Plateau, and at San Marcos have expanded the spatial knowledge of glaze paint usage in the northeast part of its range. Kari Schleher's continuing research with surface collections at San Marcos (Schleher 2010b, 2017) is leading to more detailed understanding the critical role of this large Classic period community in the mining, processing, and ultimate distribution of lead-based pigments derived from the nearby Cerrillos Hills.

Most directly related to this paper's subject, replication experiments by Eric Blinman and others have fairly successfully duplicated Rio Grande Glazeware vessels (Blinman et al. 2012). Blinman and Dickerson have both succeeded in creating replicas of Rio Grande Glazeware pots, using native New Mexico clays, slips and paints. Blinman has utilized galena ore from the Cerrillos Hills and native, natural base clays and slips in replicating prehistoric glazed pottery quite faithfully. Pigments were prepared from crushed galena ore and made into a pigment with a binder to permit application. The liquid binder was made with traditional Rocky Mountain beeweed.

It is believed that already prepared paint pigment was distributed among the wider Pueblo villages, rather than raw galena ore. Archaeological evidence of raw crystalline lead ore in prehistoric contexts is extremely rare. Replication vessels have accurately reproduced results with native clays, slips, paints and designs. Firing the new vessels has had limited success, however, and paints have at times yielded odd colors, and modern potters have not always been able to reproduce exactly the appearance of Puebloan glazeware of the Classic period. In all, they do not consistently display the greenish, brownish paint colors, runniness, or slip discoloration of the ancient Pueblo wares (Blinman et al. 2012:112). More tests will be required to completely replicate ancient practices, but these practical reconstructions are essential to understanding precisely how prehistoric glazeware results were attained. These experiments with directly reproducing ancient glazeware results are continuing, and Blinman's work and his collaboration has indicated the need for the XRF testing for determination of paint constitution reported in this paper.

Glazeware Paint Deterioration and Effects of European Contact

In the general time scheme of glazeware history, spanning over 300 years from about 1300 to 1680, changes in paint discoloration and runniness as well as slip cloudiness occurred over a long period, and increasingly during the last 150 years. Some sagging of paint lines on the polychrome decoration is observed as early as Glaze C (ca. 1450), which became more frequent in Glaze D. General paint runniness and discoloration, as well as slip color dullness became the norm in Glaze E, and E-F (prior to Spanish colonization). In Glaze F, this was accompanied by different designs and layouts, and a return to simple bichrome designs (Glaze-on-red, Glaze-on-yellow). The last gasp of glazeware, during Glaze F, was short lived, occurring during the continuous residential Spanish colonization in 1598 until the Pueblo revolt of 1680. Sporadic continuation of glazed manufacture evidently continued at refugee sites and in the Santa Fe area until about 1700. It is important to note that the trend toward glazeware technological decline began well before Spanish contact, as early as Glaze C in some instances. This is reflected in the Chamisal sample here (discussed below). Snow (2012:122) also notes runniness in glazes prior to Glaze F.

Furthermore, sporadic and very brief encounters with Spanish expeditions during the period of the Entradas of 1540 to 1598 would have had no effect on local production of domestic wares at the Pueblos. Indeed, the threats and even the attacks against the Middle Rio Grande Pueblos by Spanish exploring parties, starting with Coronado expedition, caused determined resistance and retraction on the part of the Pueblo populations. In short, no significant effect of European culture has been seen upon the output of glazeware potters until the Pueblos were colonized and then forced into continuous contact with Spanish residents at about 1600, ceramically with Glaze F, as defined.

Under the impact of full colonization after 1600, drastic disruption by disease, enforced relocation, and religious indoctrination was devastating to Pueblo society (Barrett 2002). But exactly what effects did it have on ceramic manufacture? At many sites, overall quantities of Glaze F are much lower than in earlier phases, probably due to population decline. New vessel forms in Glaze F, soup plates, candelabra, and other vessels forms, inspired by Spanish models were sometimes requested from the Native potting community. Native vessel forms and designs styles were altered, on some pieces at least, away from previous Puebloan norms. These are sometimes referred to as "colonowares" (Dyer 2012). These were manufactured for Spanish households by native Pueblo potters. As such, the production repertoire became a mixture of traditional Puebloan vessels forms and designs together with shapes and designs affected by European models, and the net effect probably differed from place to place (Capone 2006; Dyer 2012,). Moreover, it is also possible that paint recipes were being altered because of accessibility to traditional sources in the Cerrillos Hills, by Spanish mining procedures, or smelting activities (Blinman et al. 2012; Thomas 2012), although the estimated effects of Spanish colonization and mining practices on native ceramic production are controversial (e.g., Snow 2012; Thomas 2012).

Despite such potential effects during the seventeenth century, however, Glaze F remained surprisingly similar in general Puebloan techniques and outward appearances to Glaze E and E-F of pre-colonial times. Inspection of Glaze F sherds reveals that large amounts of thick glazed paint were often applied, with no suggestion of scarcity of lead pigments. Dyer's study (2012) showed little difference in technological change between pre-contact and post-contact ceramics in several regions of New Mexico. Production of soup plates and candlesticks (colonowares) by Pueblo potters involved new forms but were accomplished with traditional techniques. Dyer notes "little evidence of disruption by the Spaniards", and the traditional large bowls and ollas continued in manufacture, as in earlier times (Dyer 2012:144). Although slips and paints on soup plates differed somewhat from those usually evidenced on Pueblo vessel forms, the discrepancies were minor. In fact, the European-inspired forms "are similar enough to traditional bowls to be considered the same ware as other Rio Grande glaze-painted ceramics" according to Dyer (2012:144), as she evaluated both continuity and change. Similarly, Schleher, working with data from San Marcos Pueblo (2017:126), concludes that the Spanish presence and the resulting social and economic effects, "…are not reflected in any great change in the measured amount of variation seen in the glaze ware ceramics produced."

Nevertheless, by time of direct continuous European presence at about 1600, the "decline and fall" of glazeware vessel slips and paints was almost complete, culminating a lengthy period during which these processes had unfolded for at least a century and half prior to the Historic period of the seventeenth century. In sum, the series of Rio Grande Glazeware types had experienced an increasing tendency for glaze paint runniness and discoloration, as well as slip color darkening, over the entire preceding 150 years.

Potential Effects of Pottery Firing Conditions

Experiments by Scott Kirk

In 2013, Scott Kirk, an anthropology student at the University of New Mexico, carried out kiln experiments to determine the original firing temperature of local Rio Grande Glazeware (Kirk 2014). He also proposed that the late glazed pottery of the historic period was sometimes fired hotter than earlier, causing increased runniness. This is an intriguing idea, especially as new sources of fuel were now available to Pueblo potters, especially dung from domestic animals (use of dung as fuels is mentioned by Shepard [1965a]). Dried dung, especially from sheep and goats proved to be a good fuel material—it stacked easily, creating a uniform cover around the stacked vessels in the firing pile. Also, it burned evenly, and additional "chips" could be added during firing if needed. Moreover, if blackened pottery was desired (as at modern San Ildefonso and Santa Clara), powdered dung might be added to the pile toward the end of the process, thus creating a dense black smoke to penetrate the pores of the vessel walls. Production stages of Historic Pueblo wares have been discussed by various researchers. Changes in types of fuel and the use of animal dung in early Historic times have been discussed by various authors, including Shepard (1965a), Dyer (2010), and Schleher (2010b).

Although higher and more uniform heat afforded by dung fuel began to benefit open-air Pueblo firings after colonization in 1600, that would not have been the case in pre-Colonial days. For centuries, Native potters in the region had fired their wares in open fires, probably in stacks of overturned jars and bowls (as has continued into present times). During the Classic (Pueblo IV) period, before 1600, production and firing of glazeware would have involved stacked vessels fired in much the same way as had been done in prior centuries. The fuel in this region was mainly wood, and the most available species at lower elevations were piñon and juniper. Using these types of wood, firing was possibly less intense, lasted longer, and was less controlled in atmosphere than dung-firings of Historic and modern times (Shepard 1965a:75-77). Except for the fuel and the historic advent of smudged blackware, prehistoric historic firing methods were probably very similar to those recorded historically and still in use in the present day.

Kirk tested the original firing temperatures of sherds of different time periods (Glazes A E/F, and F), by means of successively higher firings on a set of Pueblo glazeware sherds. A large sample was used including sherds from Alameda, Chamisal, and Kuaua pueblos. I helped identify the sherds to type and age. By increased firing temperatures at 100-degree increments, Kirk was able to bracket the original firing temperature of the sample sherds. He was also able to observe what changes occurred at each firing temperature level. His results showed that glazeware had been fired between 550° and 750° C (Kirk 2014:21). This range is considered to be low to middle in temperature. The Glaze F sherds generally fell into the same range, but a few were fired hotter than the earlier ones (five of 26 samples) though the difference was not statistically significant (Kirk 2014:8).

Results showed no differences between sherds from Chamisal, Alameda, and Kuaua—they all behaved the same way. He concluded, "In any event, these experiments show that many of the Puebloan Glazed Wares were not fired at higher temperatures as has been typically thought and thus, changes seen in Glazes E and F ceramics due to a runnier Glaze must have been from a change in how the glazes were made or an aesthetic preference for runnier glazes" (Kirk 2014:8).

Hypothesis of Firing Times and Firing Atmospheres

Kirk's experiments suggested that heat alone was not necessarily the major factor in the decline of glazeware paints. I began to work with a similar idea, that the changes observed on glazewares had to do with alterations in firing routines and the length of firing for early vs. late glazes over time. Kirk's experiments showed that glazeware firings throughout the Classic period were not excessively hot, and that Historic period firings were not consistently hotter than in earlier times. If the temperature were not the only factor, however, then the length of firing and firing atmosphere might also play a role. Specifically, changes in the length and atmospheric conditions of firing, rather than just the intensity or peak temperature of firing, might have had an effect. To this end, I designed a test to facilitate comparison of original firings to firing in a controlled oxidized kiln environment. Sherds representing a lengthy time span of middle to late times of production would be oxidized in an electric kiln for a short, but hot, firing. What would this do to the slips and paints of the runny and discolored original surfaces? What would this imply about original firing conditions?

Regardless of any firing experiments, the causes related to firing would not necessarily contradict the ones based on variations in paint chemical composition, as proposed by others; there may have been multiple causes for the ultimate observed results. Indeed, the multiple factors involved with producing glazed pottery all interacted in complex ways.

Test Design

On the premise that firing time, temperature, and atmosphere were in some way contributing to the observed problems on the late Rio Grande Glazewares, an experiment was designed to test firing conditions under controlled conditions in an electric kiln. If, as suspected, firing conditions became increasingly affected by prolonged firing times and reduction and/or fire clouding, these effects might be modified or even removed by refiring in more "ideal" conditions. Such conditions would be produced in an electric kiln, including temperature to optimum peak (about 900° C), somewhat above the known original firing temperature. This would occur in an atmosphere of adequate oxidation (no stacking or covering), with abundant dioxygen availability. With the kiln, control of the atmosphere, temperature, and firing time might yield results that would approach more consistent and better-appearing results than their original prehistoric firings. Comparison of "before" and "after" results would allow a visual comparison of firing conditions on slip colors and glaze painted lines.

The Sample

A sample of 18 Rio Grande Glazeware rim sherds was selected from the collections of the Chamisal Pueblo, stored at the Maxwell Museum, University of New Mexico. This collection originated from excavations at a Classic period riverine site near Albuquerque undertaken in the 1980s by Kit and Arnold Sargeant. Situated on the Rio Grande floodplain, Chamisal was one of the larger Classic villages along the river, displaying essentially the whole glazeware sequence of pottery from A through F. Although the site had been partly impacted by newer construction, the Sargeants protected the remains of the old pueblo and the site was partially excavated in the 1980s. From the Chamisal type collections, this firing sample is thus all from one site, and so all the objects in it belong to the same local potting tradition. The sample's advantage is the consistency of a single community's pottery through time. Conversely, the sample specifically does not include variability caused by different "communities of potters" at different sites during the Classic period, a dimension to be studied in the future.

Table 1 gives the identification of the 18 sherds selected for testing. All were likely from locally made Chamisal vessels based on the identification of the local rock tempering material. As they were specifically drawn to reflect a range of paints, slips, and firing errors, they tend to be late in the sequence, ranging from Glaze C through E-F, including the prehistoric span during which errors

Table 1. Tempers and pastes of the Chamisal Pueblo sherds selected for refiring sample.

ID	Glaze Type/Time	Temper	Munsell Color of Paste
a	E-F	granitic (IIR)	7.5YR 7/6
b	E-F	granitic	7.5YR 6/8
c	E-F	granitic	5YR 6/8
d	E-F	granitic	7.5YR 7/6
e	E	granitic	7.5YR 6/8
f	E	granitic	7.5YR 6/8
g	E	sherd & granitic	5YR 6/8
h	E	granitic	5YR 6/8
i	E	granitic	5YR 5/8
j	E	basalt	7.5YR 6/6
k	E	granitic	5YR 6/6
l	D-E	basalt	7.5YR 6/8
m	D	basalt	7.5YR 6/6
n	D	basalt	7.5YR 6/8
o	D	granitic	5YR 6/6
p	D	granitic	7.5YR 6/8
q	D	granitic	7.5YR 6/8
r	C	basalt	5YR 6/8

"granitic" = dominated by quartz and feldspar (pink or white), smaller amounts of mafic minerals, including biotite and muscovite mica, hornblende. Origin in Sandia Mts.

"basalt" = black or red vesicular or dense basalts from West Mesa lava flows.

were quite apparent. No historic post-1600 Glaze F sherds were available, although Kirk had already tested some. The sherds of early Glazes A through early C tend not to reveal any firing and glaze paint problems. Later period sherds were drawn with respect to having a variety of slip and paint color problems. Slips varied from red to pink to yellow, but frequently darkened and gray. Paints varied from black to brown to green. Some paints were runny and bubbly, others were not (Figures 1, 2, and 3). Several Glaze A-C sherds were also used for visual comparison to the firing sample; these showed no slip or paint problems, (Figures 4, 5, 6, and 7).

Glazeware Sample Paste and Temper Characteristics

Having selected a wide variety of Chamisal sherds from Glazes C to E-F, displaying different kinds of paint and slip problems, the tempering

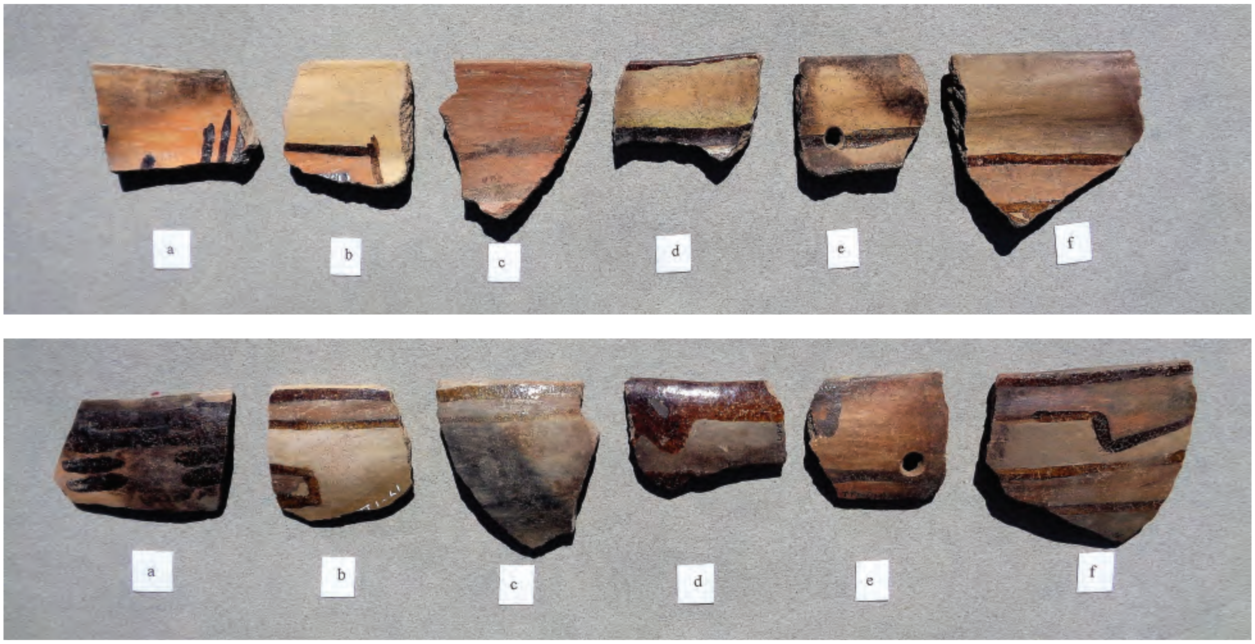

Figure 1. Chamisal Rio Grande Glazeware specimens a to f, interior and exterior, before refiring.

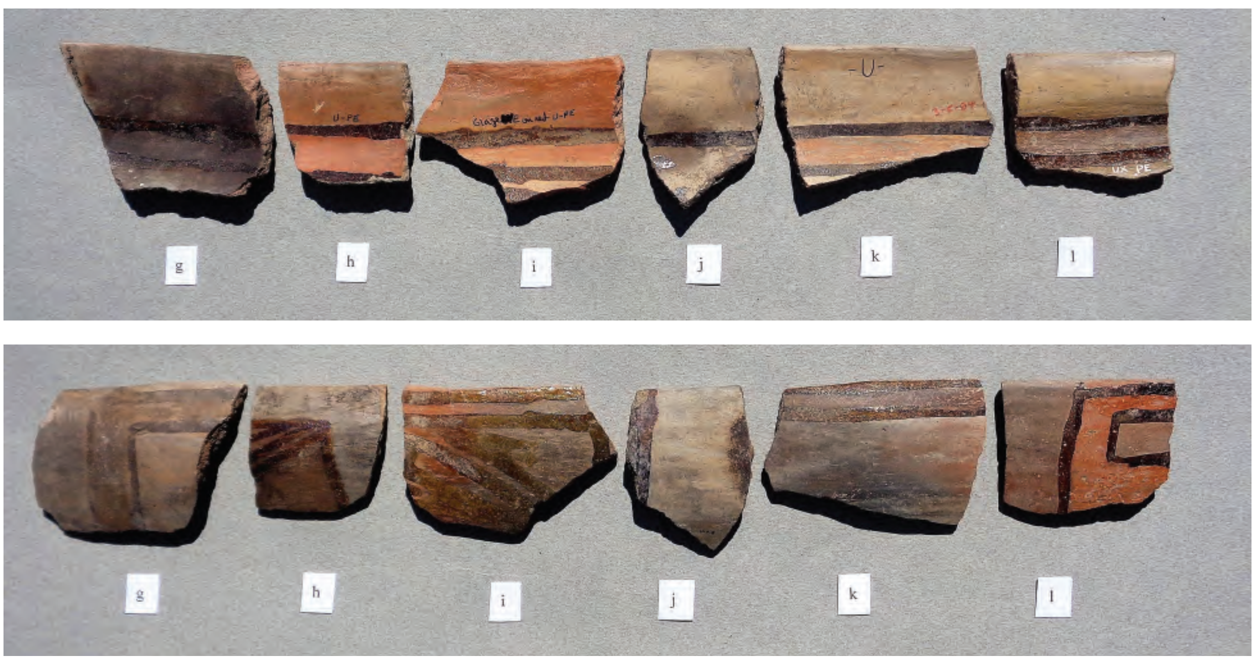

Figure 2. Chamisal Rio Grande Glazeware specimens g to l, interior and exterior, before refiring.

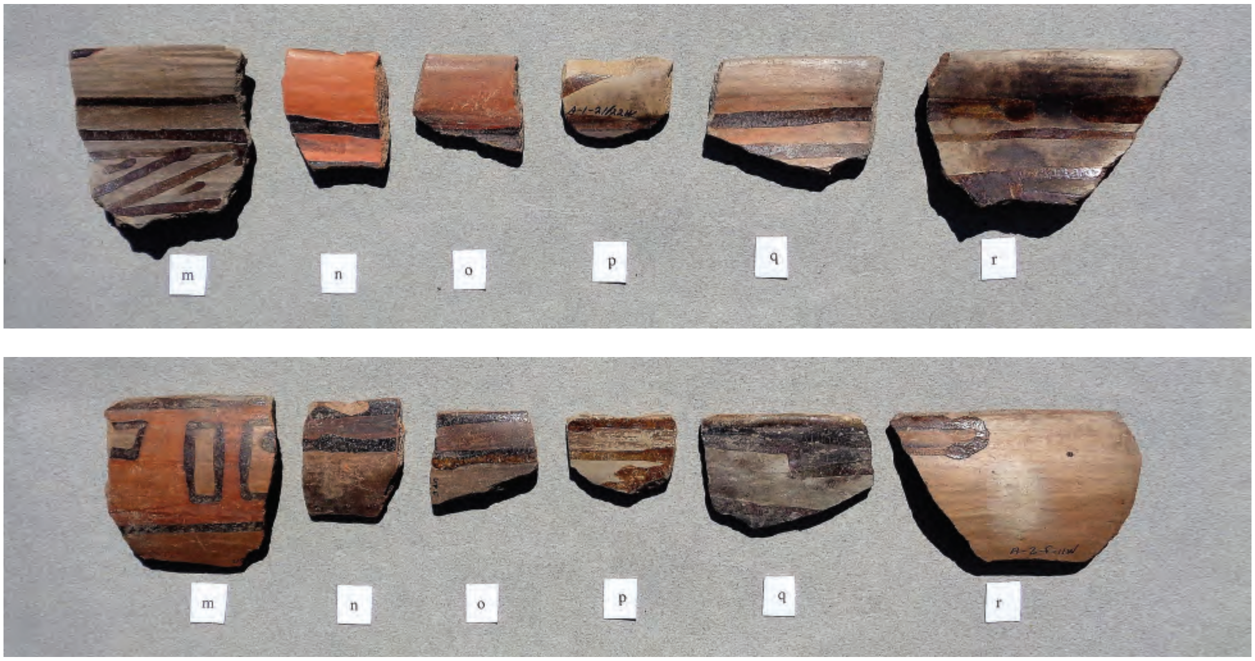

Figure 3. Chamisal Rio Grande Glazeware specimens m to r, interior and exterior, before refiring.

Figure 4. Los Padillas Glaze Polychrome.

Figure 5. Agua Fria Glaze-on-red.

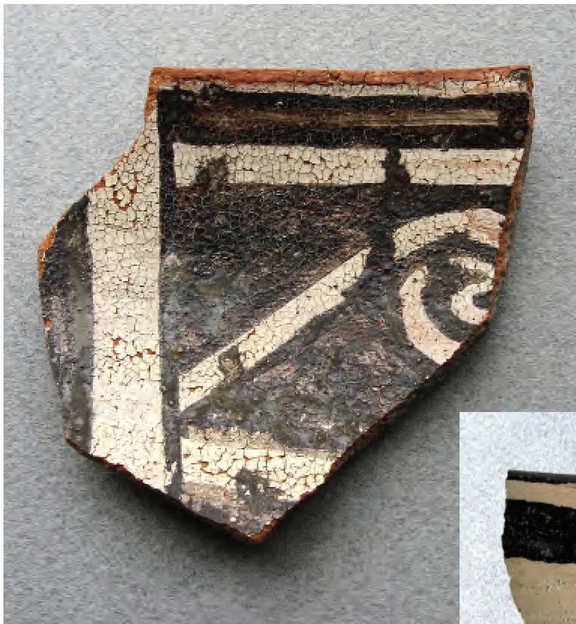

Figure 6. (left) San Clemente Glaze Polychrome.

Figure 7. (below) Largo Glaze-on-yellow.

material and original paste colors were also recorded. The tempers and initial paste colors tend to be quite uniform, as expectable within a single pueblo's practice (Table 1). Here, in the Middle Rio Grande, tempers are typically basalts from the flows of the West Mesa, or granitic (with variations), based on the exposed granites of the Sandia Mountains to the east. The tempers are quite uniform, with sherds easily identified as either basaltic or granitic and therefore thought to be locally made and the vesicular basalts and granitic rock viewed a consistent hallmark of the Classic period glazeware towns in the Albuquerque vicinity. These two basic classes of rock tempers were recognized quite early by Shepard (1942) in the small samples she studied from several riverine pueblos in her pilot summary overview of the Classic period glazed temper distributions. Much more detail has become available since then. Subsequent studies by this author of large samples of glazeware from contemporary riverine sites via binocular microscope have yielded basic data on rock tempers typically chosen by local potters. These studies have confirmed the continuous unbroken series of glazeware manufacture locally at riverine Classic period settlements. And we know that use of these basic lithic tempers continued consistently through the Classic until the seventeenth century following a short period in which ground sherds were used for temper of Los Padillas Glaze Polychrome around 1300. Kurota's (2008, 2013) studies of the same glazeware sequence at the nearby Alameda site have yielded similar results, as have those at the Montaño Bridge site (Schleher (2010a) and Chamisal Pueblo (Franklin 2012; Garrett 1993).

Similarly, in this Chamisal sample, the initial Munsell colors of the paste show uniformity (Table 1). Munsell colors (before refiring) are in the range of 5YR to 7.5 YR, and fairly bright (6/8 to 7/6). The narrow range of colors is likely indicative of consistent utilization of a single clay source. Clay was most likely obtained from alluvial riverine sources along the Rio Grande, and raw clays in the vicinity match those of Chamisal ceramics in refiring tests (Franklin 2012).

In sum, the sample from Chamisal Pueblo exhibits homogeneity in both temper and paste clay. From the same occupation site and same potting village group, the sample exemplifies consistency within a local production tradition over a long span of glazeware time. With those paste/temper variables as "constants" at a single site, the observed variations in the firing experiment would thus be attributable to time, slip and paint materials, or firing practices.

Initial Slip Color and Paint Appearance

The original condition of the sherd sample was closely examined (Figures 1, 2, 3). Examination of initial coloration and paint characteristics of these sherds of Glaze C through E-F identified problems with slips and glaze paints. By the time of early Glaze D, there was considerable variation in slip color and paint color, and "errors" appeared across sherds of the same general time period, becoming more pronounced with time. Specifically, slips from earlier periods were either red or yellow, but changed to often (but not always) appear darker. Reds became magenta, maroon or even brownish; yellow slips were more often buff or light gray. In fact, slip colors show as much color variability as the paints themselves, and deserve equal study. The glaze paint, which had been well controlled and black became runny or bubbly, often running or sagging away from the line of application. There are even differences between the appearance of the interior and exterior surfaces of the same bowl.

Moreover, there is an association between discolored slips and these paint problems on any given surface (Figures 1, 2, 3). In this sample, bright slips and controlled black paint can still be seen on the original condition of some sherds in the sample: b (interior), h, k, q, m (exterior), and n. On the rest, however, moderate to severe discoloration is evident. In all, glazes D thru E-F exhibit much variability in the slip coloration and paint color and runniness of specific sherds, despite the overall time trend towards increasing deterioration through time, as compared to earlier glazeware of the A thru C periods, which had been mostly free of such issues.

On some bowls it is clear that if the paint turned runny during firing, it ran towards the rim, indicating that the bowls were fired inverted, as is often done in modern pueblos. Accordingly, where there is evidence of clouded slips and discolored paint, these tend to occur on the same vessel surfaces together. Especially on the bowl interiors, discolored and runny paints are seen against darkened grayish slips; the exteriors may exhibit the same features, but often not as markedly. It seems that the crowding and inversion of bowls in the firing stack had an effect of the paints and slips of the interior vs. exterior surfaces, and that close vessel stacking in general had a negative effect on exposure to particular surfaces to even high heat. Potentially, these results would be caused by variable conditions of oxidation vs. reduction and fire-clouding.

Kiln Experiment

The 18 sherds were then fired together in an electric kiln, reaching a temperature of 900° C. This temperature was maintained for 10 minutes, and then the kiln turned off. Samples were allowed to cool slowly in the kiln and were not removed until the next day when they were at room temperature. The 18 sherds were then photographed (Figures 8, 9, and 10), and compared to the pre-firing conditions (Figures 1, 2, 3) to evaluate the effects oxidation. Shepard, in her *Ceramics for the Archaeologist*, describes this same technique for testing finished Puebloan ceramics in a controlled temperature and atmosphere environment.

The resulting effects of heat and oxidation on the glazeware samples was dramatic. Previous

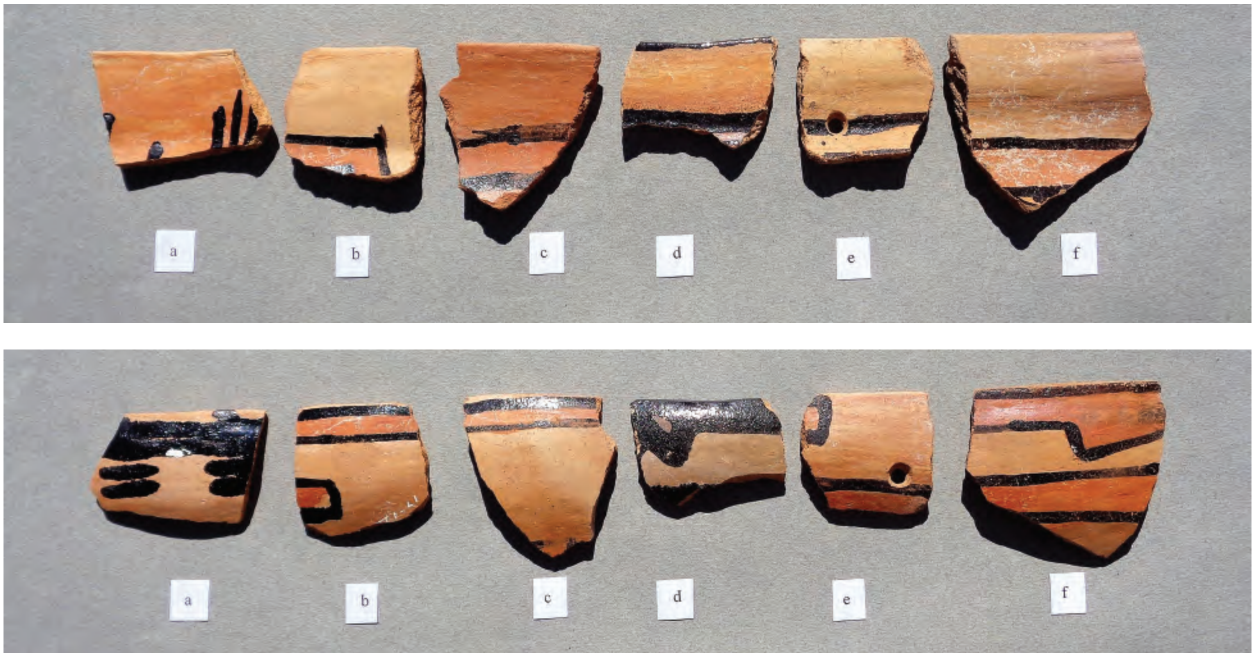

Figure 8. Chamisal Rio Grande Glazeware specimens a to f, interior and exterior, after refiring.

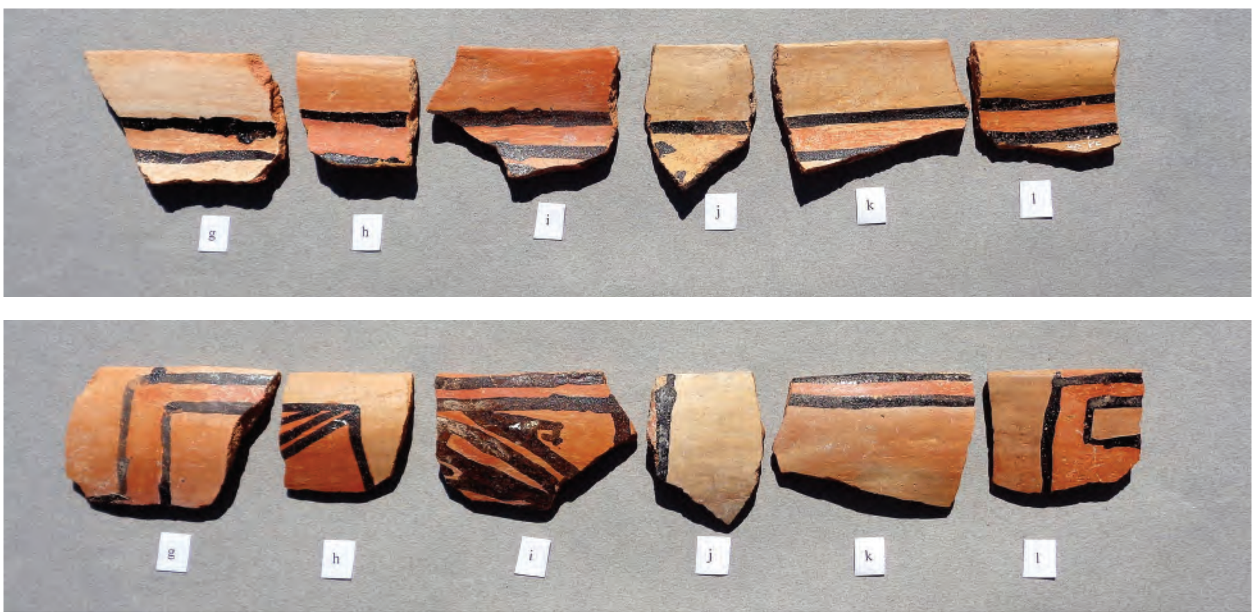

Figure 9. Chamisal Rio Grande Glazeware specimens g to l, interior and exterior, after refiring.

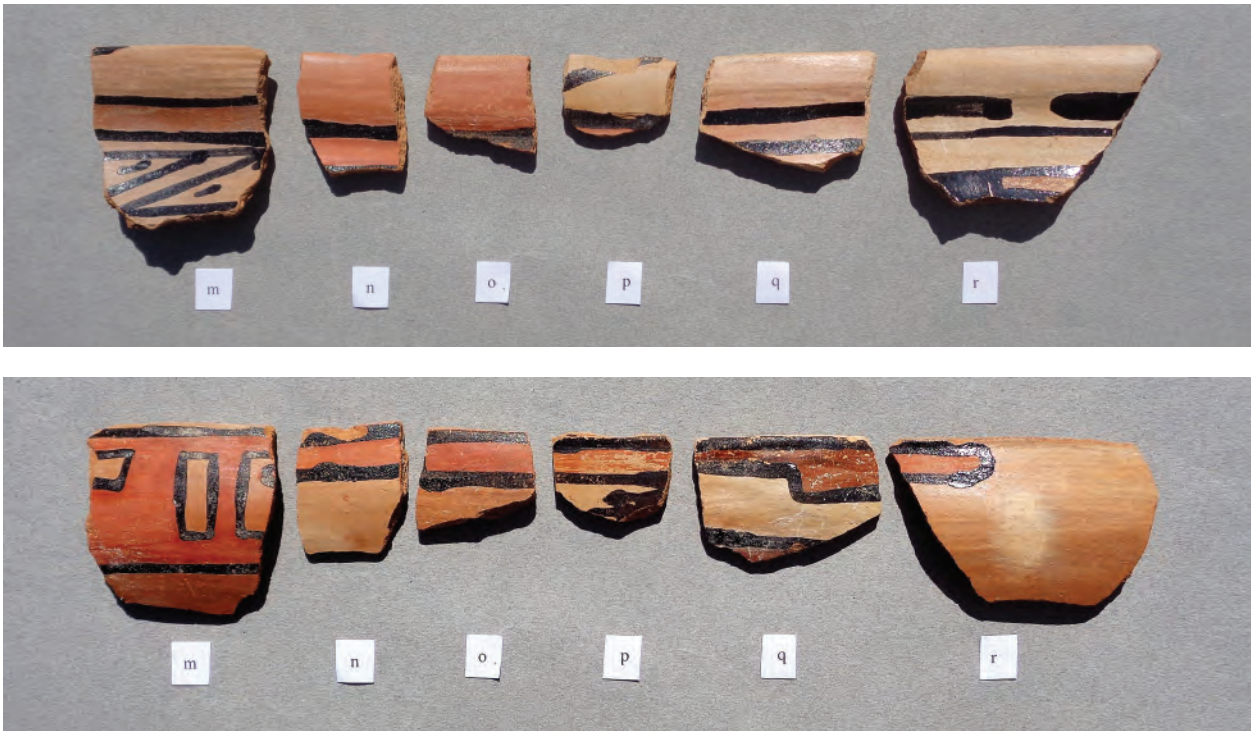

Figure 10. Chamisal Rio Grande Glazeware specimens m to r, interior and exterior, after refiring.

paint colors of black, gray, brown, or green all fired to a uniform shiny black. Basically, no color variations remained, all turned out dense black. This suggests that if original firings had been done under consistent oxidizing conditions for the correct amount of time, much of the aberrations of paint color may have been avoided. Furthermore, slip colors became consistently lighter and clearer. Original slip colors intended to be red or yellow-buff had often been affected by the original firings also. As observed in their original condition, this had actually resulted in dull and darker slip shades, darker reds, and yellows dull and even gray. Thus, slips as well as paints, had been affected by original firing conditions.

Interestingly, no additional running of the paint occurred upon refiring even though this kiln firing at 900° C was undoubtedly at a higher temperature than the original ones used by the potters. Kirk's tests showed that glazewares were originally fired between 500° and 750° C. Shepard (1965a:Table 3) recorded nine firings at various New Mexico Pueblos. The temperatures ranged from 625° to 940° C, with an average of 783° C for all. Thus, the present kiln test clearly exceeded original firing temperatures, and yet no additional runniness occurred. This implies that glaze runniness was not just a function of peak temperature, but also of other variables, either paint composition, firing length and atmosphere, or both.

Also, it was noted that these changes in paint and slip color in the context of an oxidation atmosphere occurred consistently, regardless of the time period of manufacture (Glaze C thru E-F). Refiring resulted in consistently glossy dark black paints and clear slip colors regardless of time of production. This suggested that problems with the original firings may have been responsible, somehow, for the inconsistent and heterogeneous results observed on the finished pottery. At this point, it appeared that these samples from different times in glazeware history, all suffered from similar problems, and that having an oxidized firing to a moderately high temperature, with no other sources of interference, would have yielded consistent and bright surfaces. After all, nice results had been achieved with the earlier glazed pottery in this same tradition. Correct firing methods may also have avoided runniness, since Glaze A and B paints did not run and sag during earlier times. In sum, the late glazeware slipped surfaces and paints could thus have appeared quite comparable to those of the early Classic, if they had been fired "correctly."

X-Ray Florescence Testing

Although initial kiln oxidation suggested that variations in original firing were responsible for the vagaries of paint and slip color, it was also possible that the chemical and elemental variation between painted lines might also have affected the outcome. All samples were therefore tested for paint composition to see if this had any association with paint quality or color through time.

XRF Testing Procedure

XRF tests were conducted by Bob Florek at the Office of Archaeological Studies laboratory in Santa Fe. Tests were done July 24, 2019 and results tabulated and received next day. Bob sampled all of the sample sherds, testing glaze paint lines in several places, taking three measurements, both on the interior and exterior. His results are shown in Table 2. This table shows the glazeware time period chronologically, from late (E-F) back to early (C). Again, no Glaze A or B sherds were tested, as those from Chamisal did not exhibit deteriorated paint lines. Bob reported readings for lead, iron, manganese, copper, and zinc (center columns), as well as ratios of one element to another (e.g., manganese/lead) in the right columns (Table 2). He then highlighted in yellow those readings which appeared to be relatively high compared to the other samples.

Interpretation of XRF Results

Overall, the 18 samples display internal consistency in the amount of lead and the ratio of lead to other elements (Table 2). Lead was, in all cases, clearly the dominant mineral. However, considerable variation is evident within each sherd. Perhaps this resulted from uneven application of paint pigment, or variations in the mixing of the pigment itself, and perhaps lack of uniform mixture of the paint prior to application.

The data were also examined for evidence of change through time in amount of lead, and lead ratios to other minerals, despite the synchronic variability already noted. With the table data arranged chronologically according to glazeware type evolution, any change would appear from top (late) to bottom (early) in Table 2. However, examination of the table vertically does not reveal any clear trend of increase or decrease of lead through time, either in absolute amounts, or in ratios to other elements. Higher readings of lead relative to other ingredients occur on sherds of all time periods, which may be the prime determining factor in "glazed" paint appearance.

Although it has been postulated by some investigators that the amount of lead might have increased through time during the sequence (for example Shepard [1942] for Pecos Pueblo), these data do not support that trend for the Chamisal sample. Indeed, some of the highest lead (yellow highlighted) readings occur earlier (on Glazes C and D), rather than late. Lack of an obvious temporal trend is also noted for the "ratios" columns, showing relative amounts of elements to each other. In the columns of Table 2, the highlighted "high" cells are not necessarily the same as those based on absolute amounts (in the left columns). Examination of the raw lead figures in the Lead column do not display any clear trend through time, but with lead dominant in all samples. In fact, the Glaze C sherd (bottom of chart) revealed a comparatively high lead rating. The ratio of manganese to lead may increase through time, (Table 2) although the trend is weak.

Table 2. XRF measurements of glaze painted lines on 18 bowl rims from Chamisal Pueblo.

XRF		time		oxidized	lead	iron	mangan:	copper	zinc	ratios				
Reading	sample	period	side	color	Pb	Fe	Mn	Cu	Zn	Mn/Pb	Cu/Pb	Zn/Pb	Cu/Mn	Zn/Mn
2	a	E-F	out	black	197137	19396	36520	7768	16261	0.185	0.039	0.082	0.213	0.445
3	a		out	black	385620	24166	70874	18384	30760	0.184	0.048	0.080	0.259	0.434
5	a		in	black	100812	21524	18516	5280	7569	0.184	0.052	0.075	0.285	0.409
7	b	E-F	out	black	79122	26433	11858	852	20847	0.150	0.011	0.263	0.072	1.758
8	b		out	black	52437	30271	10758	680	15900	0.205	0.013	0.303	0.063	1.478
11	b		in	black	33155	26542	10189	570	13297	0.307	0.017	0.401	0.056	1.305
13	c	E-F	out	black	50153	22115	8026	490	4938	0.160	0.010	0.098	0.061	0.615
14	c		out	black	47832	22835	8192	430	4507	0.171	0.009	0.094	0.053	0.550
16	c		in	black	40344	21489	5791	477	3312	0.144	0.012	0.082	0.082	0.572
18	d	E-F	out	black	306508	38046	80737	4195	11960	0.263	0.014	0.039	0.052	0.148
19	d		out	black	184879	22543	49738	1354	7963	0.269	0.007	0.043	0.027	0.160
21	d		in	black	182601	21210	62080	3101	9171	0.340	0.017	0.050	0.050	0.148
23	e	E	out	black	45575	30927	8919	627	3273	0.196	0.014	0.072	0.070	0.367
24	e		out	black	92702	32635	14125	1313	5456	0.152	0.014	0.059	0.093	0.386
26	e		in	black	44686	28527	7587	323	2622	0.170	0.007	0.059	0.043	0.346
28	f	E	out	black	27647	42198	7256	204	4647	0.262	0.007	0.168	0.028	0.640
29	f		out	black	48077	39318	9086	466	6950	0.189	0.010	0.145	0.051	0.765
31	f		in	black	33900	35991	7072	333	5248	0.209	0.010	0.155	0.047	0.742
33	g	E	in	black	153702	27127	23951	1487	28355	0.156	0.010	0.184	0.062	1.184
34	g		in	black	32410	20390	5439	385	6383	0.168	0.012	0.197	0.071	1.174
36	g		out	black	62474	19882	9285	878	12594	0.149	0.014	0.202	0.095	1.356
38	h	E	out	black	31485	31183	10913	269	3740	0.347	0.009	0.119	0.025	0.343
39	h		out	black	26088	26388	9631	286	3427	0.369	0.011	0.131	0.030	0.356
42	h		in	black	64743	20660	14834	492	6959	0.229	0.008	0.107	0.033	0.469
44	i	E	out	black	124542	19701	9997	767	6152	0.080	0.006	0.049	0.077	0.615
45	i		out	black	116521	21506	10245	898	5409	0.088	0.008	0.046	0.088	0.528
47	i		in	black	71712	24299	6920	534	3587	0.096	0.007	0.050	0.077	0.518
49	j	E	out	black	69613	30904	17255	1605	15791	0.248	0.023	0.227	0.093	0.915
50	j		out	black	145071	35767	32347	2469	30330	0.223	0.017	0.209	0.076	0.938
52	j		in	black	75464	38144	18736	1947	15900	0.248	0.026	0.211	0.104	0.849
54	k	E	out	black	40470	24521	20768	318	6799	0.513	0.008	0.168	0.015	0.327
55	k		out	black	35637	23641	20866	348	6605	0.585	0.010	0.185	0.017	0.317
57	k		in	black	50009	23341	28488	384	9121	0.570	0.008	0.182	0.013	0.320
59	l	D-E	in	black	63647	51181	12555	565	7217	0.197	0.009	0.113	0.045	0.575
60	l		in	black	105121	44684	22858	926	12102	0.217	0.009	0.115	0.041	0.529
62	l		out	black	47622	48273	9320	538	4964	0.196	0.011	0.104	0.058	0.533
64	m	D	in	black	44269	30096	16499	817	8711	0.373	0.018	0.197	0.050	0.528
65	m		in	black	56993	31290	19695	1038	11333	0.346	0.018	0.199	0.053	0.575
67	m		out	black	37202	35388	12822	674	6966	0.345	0.018	0.187	0.053	0.543
69	n	D	out	black	100081	35923	30078	2562	12842	0.301	0.026	0.128	0.085	0.427
70	n		out	black	134491	36543	34767	2939	16217	0.259	0.022	0.121	0.085	0.466
72	n		in	black	66397	32821	22415	1620	9219	0.338	0.024	0.139	0.072	0.411
79	o	D	out	black	54230	39873	8550	781	9347	0.158	0.014	0.172	0.091	1.093
80	o		out	black	36340	34023	6496	520	6646	0.179	0.014	0.183	0.080	1.023
82	o		in	black	35050	39090	4823	566	5527	0.138	0.016	0.158	0.117	1.146
74	p	D	out	black	33541	28696	6427	1188	368	0.192	0.035	0.011	0.185	0.057
75	p		out	black	123361	21869	16505	2647	1083	0.134	0.021	0.009	0.160	0.066
77	p		in	black	58573	25965	7104	1594	474	0.121	0.027	0.008	0.224	0.067
84	q	D	out	black	55179	49796	15569	2347	31096	0.282	0.043	0.564	0.151	1.997
87	q		in	black	37599	23097	12132	2048	17373	0.323	0.054	0.462	0.169	1.432
88	q		in	black	97580	23691	23024	7449	52347	0.236	0.076	0.536	0.324	2.274
90	r	C	in	black	235247	23692	59060	14951	12883	0.251	0.064	0.055	0.253	0.218
91	r		in	black	133540	30300	30748	9707	7289	0.230	0.073	0.055	0.316	0.237
93	r		out	black	65388	37656	15373	3312	3320	0.235	0.051	0.051	0.215	0.216

A comparison can be made to San Marcos, where Schleher and colleagues (2012) report that the pigments at San Marcos were quite stable and consistent through time in basic components, mainly the high lead percentages, and San Marcos potters used a single Cerrillos Hills source ore. However, minor elements such as manganese, copper, and iron fluctuated though time (Schleher et al. 2012:Table 10.4). These non-lead impurities, however, may have affected the appearance of the final paint. Indeed, "the interaction of the slip, clay body and glaze during firing, and the presence of impurities such as copper in the source ore, may be major factors that introduced these other elements into the final composition we see today" (Schleher et al. 2012:103). Actually, this also appears to reflect the XRF results obtained here, with the Chamisal sample. All samples have consistently high lead percentages, but the minor components vary. Possibly these are "fortuitous" and unintentional variations (or "colorants"), introduced from fluctuations in pigment recipes, or the interaction of paints with slips and clays. The other unaccounted factor is, of course, differential firing conditions.

In sum, XRF results revealed consistently high values for lead on all tested glazed paints. There is a considerable range of variability between the glaze painted lines, even on each sample sherd. In general, no clear time trend across the samples from Glaze C to E-F showed up. Evidently glaze paint composition, despite some internal inconsistency, remained substantially the same with respect to net results for a long period of time. Of course, these readings apply to only one Classic period site, and larger test sample sizes would always be desirable.

Refired Paint Color Compared to XRF Results

Perhaps the most obvious result of the refired samples shown in the "before" and "after" comparison is that the uniformly oxidized paint in kiln refiring turned out consistently black. This is probably due to the fact that the XRF tests prove that lead, as a flux, was by far the dominant element in all the paint lines. The consistently black paint lines with oxidized firing occurred regardless of, and independently of, the elemental percentage variations as revealed by XRF testing. Thus, firing tests showed that *all* these samples could have produced a uniform black line in spite of the variation between them in their ratios of elements. It appears that, as long as there was sufficient lead in the paint or that lead was the dominant ingredient, a clean black line could have been achieved, regardless of other variations in composition. That is, the critical variable is the dominance of lead in the pigment, and if that were the case, a black paint line was achievable under the right firing conditions. But why did this not always happen in practice? Undoubtedly due to inconsistencies and errors in the other variable, the firing procedures.

Firing Conditions as a Factor in Glazeware Appearance

Traditional Pottery Firing Methods

Since the kiln refiring test yielded such dramatic and consistent results, attention turned to the idea that the late glazes suffered from errors in the firing process. Pueblo pottery of this nature was, and is today, fired in an open fire. (For this bright polychrome pottery, pit or trench kilns such as those known for black-on-white ceramics are not employed). Numerous vessels, typically inverted, are fired in an open stack surrounded by fuel; this process is detailed by Shepard (1965a). Traditional locations near the village are typically reused for firing many times, and such "firing grounds" have sometimes been identified at prehistoric sites; Blinman reports a "kilnfield" with rocks and charcoal at San Lazaro pueblo (Blinman et al. 2012, and personal communication, 2020). In preparation, vessels are overturned and stacked loosely. Old discarded large sherds can be used as covering to prevent embers from touching the new pots' surfaces and creating "fire clouds" (sooty black spots). Traditional fuel consists of dry wood, arranged neatly around the stacked pottery. After ignition, the fire will become very intense in a short time. The vessels are retrieved at the proper time, followed by a long period of cooling before they can be handled. Potters watch the fire closely and are especially wary of windy conditions, which may cause uneven heating, and discoloration or cracking of vessels. Even under favorable conditions, however, traditional potters are accustomed to losing a certain percentage of their vessels due to cracking. Lesser problems include smudged "clouds" or overly oxidized patches on the surface. It is a disappointing experience for creative clay artists to lose the product of their hard work.

Potential Problems with Glazeware Firings

Evidently, the late prehistoric glazeware firing conditions and practices were not conducive to producing consistently well-oxidized results, and over time, altered practices began to give negative outcomes in the finished ware. Such conditions might have occurred with prolonged firings having variable heat ranges. Poor stacking of wood can result in uneven heating. Furthermore, lack of exposure to oxygen, especially late in a lengthy firing period, would tend to result in lack of oxygen (semi-reduction), and/or actually clouding by exposure of surfaces to smoldering embers. Close stacking of many vessels close together would further reduce the exposure of surfaces to adequate oxygen. This scenario is supported by general experience and my own observations of outdoor pottery firings.

Supportive Data from Other Firing Studies

Additional support for the effect of firing times and atmospheres is available in technical works including those by Rice (1987), and Arnold (1985). Harold Colton, of the Museum of Northern Arizona, also conducted refiring experiments (Colton 1953). For additional background on this project, it seems appropriate to compare to the work of Shepard, as she observed and recorded numerous Pueblo pottery firings during her visits to New Mexico villages. She recorded methods of firing and timing and inserted pyrometers into fires to record temperatures at various stages of the firing process. Shepard's results are contained in her *Ceramics for the Archaeologist* (1965a) and provide insights on the topic of firings. She also suggests refiring in an oxidizing kiln to check original firing conditions, and clay colors before and after the tests (Shepard 1965a:20); her suggested methods were followed in this experiment and some of her observations and findings are relevant here.

Firing Times and Procedures: Shepard observed and recorded data on nine firings at several modern pueblos (Shepard 1965a:85-87). These were all above-ground firings of overturned and stacked vessels surrounded by fuel. The fuel varied from wood to animal dung. Highest temperatures usually reached after 20 minutes. At all five of the observed firings, potters pulled their wares from the fire shortly after the peak of heating, generally about a half hour after ignition. Firing times until pulling the vessels ranged from 18 minutes to 114 minutes; most were between 18 and 35 minutes between ignition and retrieval from the fire. Potters estimate readiness by the color of pots in the fire or tradition. Timing by the clock was not needed. Typically, potters waited until the peak of heat had passed, but then removed the vessels from the fire before it started to die down. Importantly, no pottery was ever left in until the fire died down (unless intentional surface blackening was desired). Fire temperatures were still hot (670° to 715° C) when the vessels were pulled. She observed (Shepard 1965a:90): "Rio Grande Pueblo potters, when firing oxidized ware, draw it soon after the temperature has passed its peak."

The Dangers of Prolonged Firing: Shepard (1965a:76) also warns of problems that occur when vessels are left in the fire too long. None of the modern potters left pottery in the fire until it started to burn down to a lower temperature with smoky conditions. and if vessels were not pulled from the fire, prolonged times and lower temperatures and non-oxidizing conditions could have affected the vessels (Shepard 1965a:79). Problems mentioned include: "discoloration by deposition of soot or local reduction" and "fireclouding." It is also essential to shield the surfaces against contact with flames, as they need to be "effectively blanketed" against clouds and smudging in an open firing. Shepard (1965a:88) states that "control of firing atmosphere is essential", and that long firing or repeated fueling causes problems. She cautions that discoloration by fire-clouding may always pose a danger in open fires. Furthermore, "poor draft or close packing of one vessel upon one another may prevent necessary oxidation" (Shepard1965a:92). Additionally, she warns that if there is "insufficient oxygen…there will be reducing gases." This will lead to iron oxides being reduced to a lower state and their color will be gray instead of red. This may be why late glazeware red and yellow slips are darker and grayer than in earlier times.

Fuel for Firing: Prehistorically the available fuel was wood. Piñon and juniper were the most available in the area. Fires with these woods have long combustion times, 3.5 to 4 hours (Shepard 1965a:79). This is far beyond the normal time at which the modern potters retrieve their vessels from the fire (above). The long-lasting fuel wood may therefore have allowed potters to leave the vessels in the flames much longer than required. If the optimum time to pull vessels is about half an hour to no more than an hour, then this wood fuel would have made it possible to leave the wares in the flames far too long. Low flames, smoke, and reducing atmospheres during the final stages of a wood fire might have negative effects on the end results. Adding extra fuel would prolong the time even more. In these circumstances, clouding and partial reduction may occur. Shepard (1965a:219) observes: "If pottery is gray…it may have been smudged, or it may actually have been reduced", and "both reduction and sooting may take place at the same time".

In all, Anna Shepard's observations and interpretations cover the interaction between: 1) clay and paint composition, 2) atmosphere of firing, and 3) length of firing and the temperature. Her astute observations and cautions seem to apply directly to the problems that affected late Rio Grande Glazeware, and suggest that firing issues were probably involved.

Tests in Open Fires with Commercial Clays and Glazes

In an attempt to replicate the paint discoloration and sagging, as well as surface darkening and smudging, two tests were run with homemade ceramics fired under varying conditions at open firings conducted by the members of the annual Kiln Conference. Test tiles were prepared by this author, and then fired under specified conditions at a conference firing in 2018 under direction of Steve Rospopo. Commercial white-firing clay was used, together with commercial glaze painted lines on both sides for reference. A flat tile and a small bowl shape were used (Figure 11). The tile and inverted bowl were placed face down on a natural sandstone slab at bottom of the open fire. They were not retrieved until after the fire had burned down. Comparison between the exposed (up) and unexposed (down) facing surfaces showed quite a lot of difference in paint color and clay color (Figure 12).

In both samples, the "down" face glaze paints remained almost the same color as when applied (pale blue and red). On the other hand, the "up" sides showed oxidized paint colors that had been brought to a more highly saturated, and presumably desirable, coloration. This is especially notable with the red glaze paint line. This test illustrates the differences between exposed (oxidized) and covered (semi-reduced) paint surfaces. It may also be seen that black fire clouds affected the surfaces, especially on the exposed (up) sides. This was a consequence of leaving the samples in the fire until it died, and also the marks of embers that must have

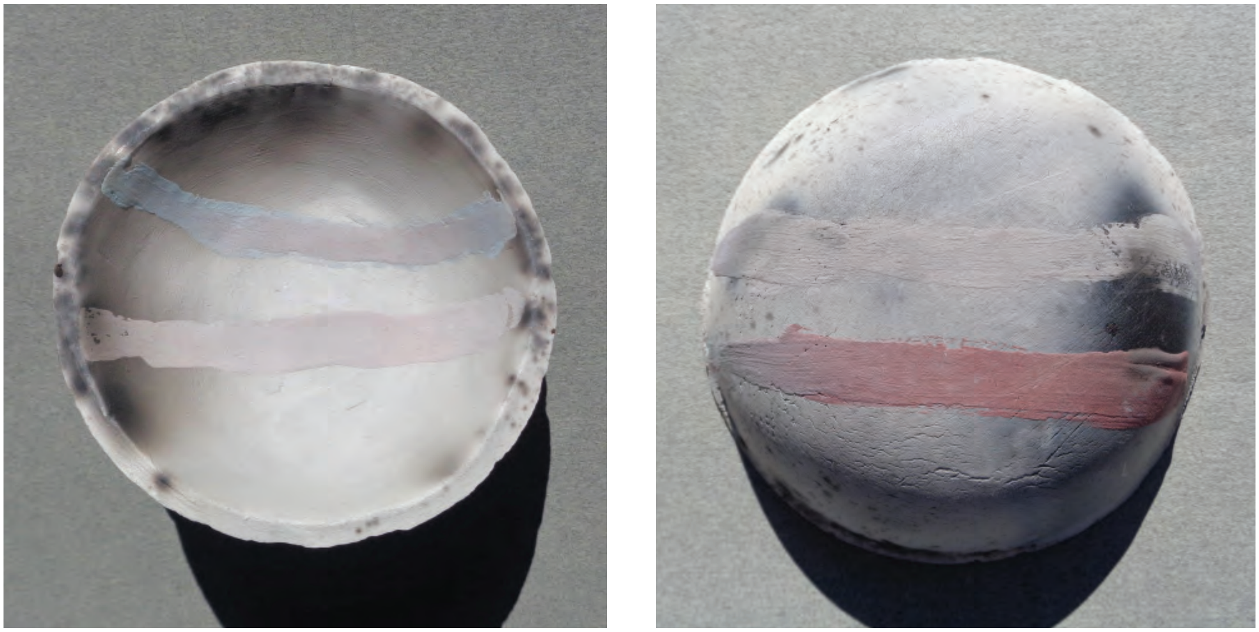

Figure 11. Test bowl placed on slab a) down side, and b) up side. Fired until fuel exhausted.

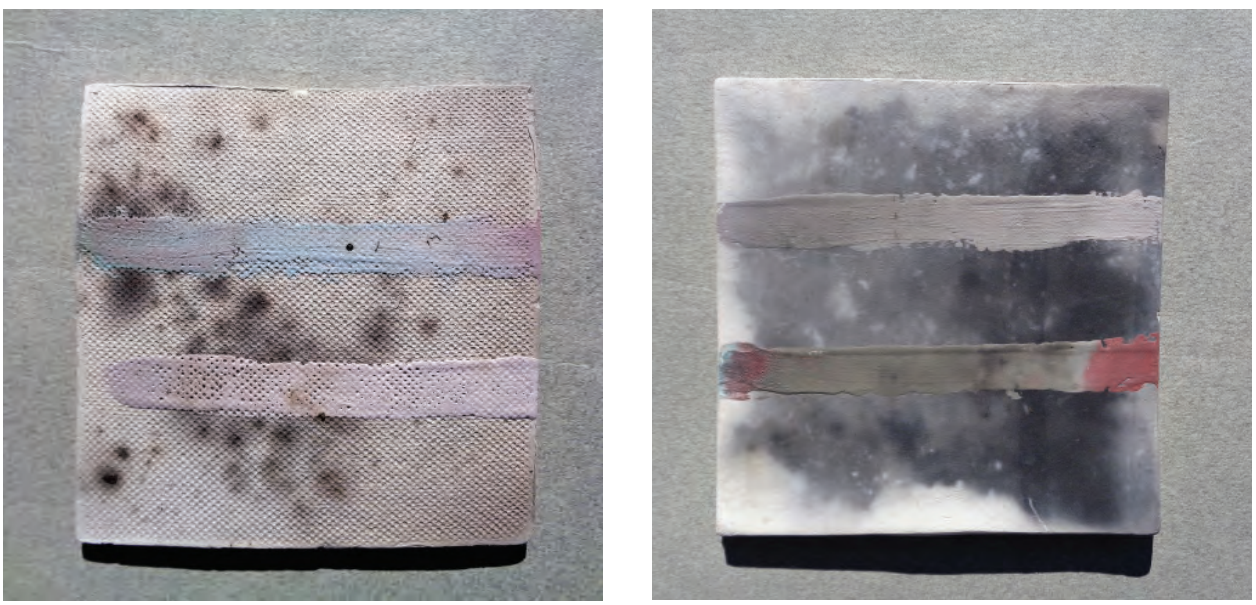

Figure 12. Test tile placed on slab a) down side, and b) up side. Fired until fuel exhausted.

fallen against exposed surfaces during the prolonged firing time span. These firing experiments were performed with modern ceramic materials, and yet their results showed expected differences between exposed and protected (less exposed) surfaces in glaze paint colors and fire-clouding during long firing regimes.

Replication firings with original ceramic materials and firing conditions

As a further test of these ideas, Eric Blinman and I have proposed to fire test bowls in outdoor firings with piñon and juniper wood. The test pots would be made by Blinman, using natural clays and slips, and painted with galena-based pigments. Blinman has already replicated ancient vessels consistently to this stage. Then, three separate firings of these identical pots would be carried out, using an open firing setting. The only variable would be the length of time left in the fire, with some pots pulled just after the peak heat, others after about two hours, and some allowed to remain in the fire until it was completely dead, (probably the next day). In this way, the variable of time and atmosphere conditions (oxidizing, reducing, smudging, etc.) could be assessed on vessels constructed and painted according to prehistoric models.

Summary and Conclusions

A sample of 18 sherds of Rio Grande Glazeware from the Chamisal Pueblo was selected for oxidization testing in an electric kiln. They ranged in time from Glaze C to Glaze E-F, or from about AD 1450 to 1600. Tempers indicated they were locally made. As the sample was drawn from a single site, it has the advantage of coming from one village's custom, locally made, but over a long period of time. Initial surfaces showed glazed paint lines that were runny, and discolored from black to brown, green, and yellow. Slips were dull, dark red, dark yellow to light gray. All samples were refired in a single firing. This was done in a standard electric kiln in an oxidizing atmosphere, reaching 900° C for 10 minutes. Cooling was gradual, over 8 hours.

The results were quite dramatic. Paints were now consistently black, no matter what the color had been originally. Glazed lines with sags and runs did not have any additional runniness; the edges of glazed lines remained as before. Slips became much brighter shades of red, yellow, buff, and white. As this refiring did not cause additional runniness of the glaze paint, it may be that short, hot oxidation might not necessarily result in this issue. Furthermore, these results occurred regardless of time period of the sample (Glaze C thru E-F); this happened during a lengthy period of glazeware history.

The problems evident in the initial pre-test appearance could have been caused by firing conditions that were probably prolonged, not controlled, and inconsistent. Delayed extraction from the fire may have caused originally bright colors to degrade, as outdoor open fires tend to decline in heat and oxygen in the hours after ignition. The appearance is consistent with prolonged exposure to the original fire, possibly reflecting long combustion times known for piñon and juniper wood fuels. Shepard's recording of modern Pueblo firing procedures for successfully achieving brightly colored oxidized pottery illustrate that prolonged and reducing atmospheric conditions were consciously avoided by potters.

In a separate test, the potsherds were examined for constituent elements comprising their paints. XRF measurements revealed that all paints were dominated by lead, as expected from pigments that were manufactured as intentionally lead-based. Secondary elements included iron, manganese, copper and zinc. Importantly, no clear evidence of increased lead percentage in the pigment was apparent through time. Variations in paint composition may have been introduced via different sources of mining, or different percentages of ingredients introduced into the mixture of the pigments. Regardless of variability in paint composition, however, *all* original paints oxidized in the kiln to essentially the same black color and texture. Therefore, the overall dominance of lead in the pigment, regardless of secondary elements, was sufficient to have produced a uniform black "glaze paint" originally if pottery had been fired to a much more consistent and shorter oxidation.

In light of the evidence, above, it appears that conditions of firing had a major effect on the runniness of prehistoric glaze paints and the increasingly dark and dull slip colors of the late Rio Grande Glazeware types. Specifically, leaving pots in an open piñon-juniper fire for a prolonged period may have cause the observed result, especially considering that all modern Pueblo potters observed by Shepard pulled their wares from the fire just after the peak of flame and oxidation. (This has also been my own observation in attending several firings at modern Pueblos). Furthermore, modern potters are aware of the potential of fire-clouding and incidental discoloration, and therefore take care to cover the exposed surfaces with broken pieces of earlier vessels for protection. Evidently, lack of care about firing atmospheres and firing length contributed to the increasingly poor paint and slip results on the late Rio Grande glazes.

Would there be any possible advantages to leaving vessels in the fire until it burned down? Possibly there would be less breakage than pulling hot vessels earlier. Thermal shock would be reduced, and a higher success rate might be obtained, but at the cost of discoloration.

Although these experiments lead to the conclusion that conditions of firing, both atmosphere and length of time, had an effect on the late glazes types, there might be other factors as well. Tests by others have suggested that variation in paint composition (or "recipes") might have affected paint coloration (see Schleher et al. 2012 and Blinman et al. 2012). Indeed, it is possible that paint composition as well as firing conditions both interacted to yield the ultimate results. Again, however, a variety of initial paint colors and runniness in the present sample all fired consistently black in an oxidizing atmosphere in this project. Moreover, the heterogeneity in paint composition, as tested with XRF, did not result in any comparable differences in the refired results, which were identically black.

These tests have shown that firing temperature and time of heat exposure in open fires were major determinants of surface coloration of both paints and slips in the late Rio Grande Glazewares (Glazes C thru E-F). Practices of firing, originally successfully producing bright slip colors and non-runny black paints on Glazes A and B, began to change as early as Glaze C in some cases. Thereafter, runniness and discoloration of paints and dullness of slips increased steadily in the late glazes until Glaze E-F at about 1600. These problems do not affect modern Pueblo potters significantly, as they pull vessels from carefully made fires shortly after the peak temperature is obtained, and none leave them in later. The one exception is when a blackware is desired (typically at Santa Clara or San Ildefonso). Potters making shiny black pottery therefore intentionally do leave vessels in the fires while it burns down after a long time, and indeed may add leaves or dung to produce the dense smoke needed to penetrate the vessels of polished blackware.

It might be objected that the smudgy color of the glazeware slips and paint discoloration away from standard black were due to post-production accidents, including inappropriate use of painted vessels over a fire, or accidental burning of rooms on abandonment. This is considered unlikely for several reasons: 1) There is no evidence that Chamisal pueblo suffered a major fire, 2) fire clouds caused during use by an ember or burning stick leave a local and small smudged or oxidized spot on the vessel surface, and those are easily identified. But phenomena studied here involve overall surface reduction as well as clouding of what would be brightly colored surfaces, and indications of generalized lack of oxidation. 3) This problem got worse through time. Glaze A, B, and C almost never reveal this sort of generalized discoloration with both the slip and the paint; the early glazes are uniformly bright colored with black glazed paint. Therefore, the pronounced increase of this problem thru time suggests changes in the production routine with the glazed pottery by the potters. Finally, this was a region-wide trend.

In sum, the increased deterioration of the paints and slips on glaze Rio Grande Glazes has been a subject of archaeological discussion for some time. In the end, several variables may have influenced the visible results of glaze painted ceramics: 1) changes in ore sources, 2) variation in mineralogical composition (even within Cerrillos Hills), 3) pigment preparation (pre-heating, mixing with other ingredients), "recipe" alterations, 4) consistency of applied pigments, 5) paint application methods by potters, and 6) methods of firing (firing times and atmospheres). It is difficult to vary only one of these factors at a time while controlling for the rest in a scientific experiment.

This project indicates that one of the major factors was the firing procedure. Extended firings and exposure to reducing and smoky atmospheres caused normally bright red and yellow slips to look dull, and paints to turn brown, green, and bubbly. Regardless of the technical issues, the "decline" of glazeware seems to imply a degree of inattention and lack of adherence to ceramic techniques and methods that had been so well perfected in earlier times. Loss of expertise and methodology over time certainly occurred, and the social-cultural implications of a faltering craft art have yet to be elucidated.

Results of this experiment apply specifically to one site's production through time. It would be interesting to know if glazeware from other major contemporary towns might exhibit similar outcomes with refiring and XRF testing. After all, Rio Grande Glazeware does vary somewhat across its production zone and 300 years of manufacture (Snow and Franklin 2015). Hopefully, comparable tests can be performed in the future to assess the variability of these firing issues at different locations.

Access to mines in the Cerrillos Hills and elsewhere during early Spanish colonial times is a topic that has been discussed by others and is outside the scope of this paper. However, the samples from this project as well as others from Piedras Marcadas and Kuaua that I have examined show that the overall amount of glazed paint applied actually increases in late types. Glazes E, E-F and F often display large surfaces covered by heavy glazed paint, green, brown, or black. Evidently, there was no shortage of raw materials for glazed paints. Generally, potters do not appear to have been hampered by restrictions to body clays, slips, or paints.

As a final thought, philosophically, we might be culturally and temporally biased in our assessment of the so-called "decline" of glazeware. Is this just a modern and unfair judgment? Perhaps those ancient potters actually preferred the altered results coming from potters' hands during Glaze E and F. In this light, the phenomenon would not be considered a "mistake." Within the modern nationwide American craft arts, there was a period in the 1970s when hand-making pottery by amateurs was quite popular. One way of decorating these handmade vessels was with abundant, drippy, commercial glaze of one or many colors. It was considered quite "the vogue" at the time. As such, we may tend rush to judgment about the perceived "decline" of prehistoric ceramic practices in the Southwest. In any case, styles change and preferences evolve; and so, as the old saying goes, "there's no accounting for taste."

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A Briefing on the Chronology and Iconography of the Mesa Prieta Petroglyph Landscape in North-Central New Mexico

CHESTER R. LIWOSZ

Formerly known as Black Mesa, Mesa Prieta is a unique and highly significant cultural landscape in Northern New Mexico along the banks of the Rio Grande. With 60,000 petroglyphs recorded to date and tens of thousands presumed not yet documented, Mesa Prieta is in the same league as world-renowned rock art landmarks such as the Mojave Desert's Coso Range. Surprisingly, however, very little recent professional attention has been given to this remarkable tableland and even less has been published about it. Research biases dismissing the Northern Rio Grande as a cultural backwater have contributed to this paucity of research and lack of published data. This article is intended as a brief report on the current state of recording, research, and interpretation of the mesa's petroglyphs. By consolidating published and largely unpublished summary data, this report will assist those with avocational or scholarly interests in becoming more familiar with Mesa Prieta.

Background

The 20-km-long (12.42-mi) tablelands of Mesa Prieta stretch from the pueblo of Ohkay Owingeh to the mouth of the Rio Grande Gorge in northern New Mexico. Over 60,000 petroglyphs have been documented on the mesa to date, with full systematic coverage of nearly 3,100 acres (out of 32,000). The mesa's petroglyphs have featured in the research of many Southwest scholars, including Polly Schaafsma (1980, 1992), Richard Ford (2002), Helen and Jay Crotty, and others (e.g., Dennis Slifer 2000). The bulk of petroglyph recording however, especially since 1999, has been by teams of trained volunteer citizen-scientists affiliated with the 501(c)(3) non-profit Mesa Prieta Petroglyph Project (MPPP). Prior to the establishment of MPPP, select areas of the mesa were also recorded by cultural resource management teams (e.g., Boyd and Ferguson 1988; Futch 2001). While many significant archaeological features and artifacts also pepper the mesa, I will largely restrict the scope of this paper to petroglyphs, save for instances when the associated archaeological materials contribute directly to discussing context and/or dating.

The myriad of petroglyphs at Mesa Prieta date to virtually all periods of the human history of the area, as determined from petroglyph designs, repatination rates, superimposition, and associated archaeological artifacts and features. In the following paper I discuss the material and visual culture of this enigmatic landform in terms of its relationship to a regional chronology, with an emphasis on the relationships between petroglyphs and key historical events in the history of the Southwest. With its position at a crossroads between various precontact and colonial corridors, Mesa Prieta and the communities living at its foot have played a surprisingly influential role in development of the region's history.

Chronology

The following covers the history of Mesa Prieta over significant time periods in its past. Figure 1 is a table of the later time periods of the Northern Rio Grande timeline, presented alongside the timeline for the Four Corners area and San Juan Basin. The timelines diverge in the Late Archaic, which will be explained below. Each section presents the predominant iconographic themes for the given time period.

Paleoindian

Paleoindian occupation in Northern New Mexico was sparse, however there is clear evidence of use of Mesa Prieta in this early time period. Projectile point fragments, including from the fluted tradition, have been recovered. Petroglyph design elements from this period, however, are poorly understood (Schaafsma 1992). Future dating attempts might be able to help distinguish Early Archaic panels from possible Paleoindian ones.

Archaic

The Archaic period is an extensive block of time in the Early and Middle Holocene during which a rather consistent pattern of human ecology and material culture is presumed to have dominated much of North America's intermountain west region. Highly mobile hunter-gatherer lifeways largely defined the human ecology of said region, a pattern once described as the "Desert Culture" by Jennings (1957), who later retracted the idea in an aptly named paper "The Short Useful Life of a Hypothesis" (Jennings 1973). The term, however, still persists in academic parlance, now describing the material and ecological patterns but largely recognized not to describe any singular group. Later successors of the so-called Desert Culture of the Archaic belong to linguistically and genetically distinct lineages, indicating nomadic foragers of the Archaic were also likely culturally heterogeneous (Schaafsma 1992:33). To emphasize the distinction between archaeological and social definitions of "culture", I acknowledge "Desert Culture" as a heuristic tool but prefer to use the phrase "Western Archaic Tradition."

Among the arid plateaus of the Southwest culture area, the Western Archaic Tradition is largely believed to have gone by the wayside centuries prior to Euro-American contact. While this may broadly be the case, there are many lines of archaeological evidence that allow us to infer patterns of behavior, social structure, and iconographic symbolism. The broad reach of this pattern of lifeways however provides ample area for cross cultural comparisons and includes regions such as the Great Basin where similar nomadic lifeways persisted among Numic populations as late as the early twentieth century (Steward 1929, 1941). Although ethnographic analogy must only be applied with extreme caution, evidence from the Great Basin can be useful for interpreting patterns in Archaic Period data. For example, Brosman's (2012) proposition that one function of southern Nevada's rock art may have been to indicate spur trails for various resource patches would be consistent with observations by MacKenzie and Borduin (2019) at Mesa Prieta linking concentrations of Archaic Period panels and artifacts to particular trails.

Early Archaic. The first clear images at Mesa Prieta are presumed to date from the Early Archaic Period (7500 B.C. to 600 A.D.). This statement should be qualified with a number of caveats. First, absolute dating techniques for petroglyphs require destructive analysis that yields coarse resolution. The few such methods that are in practice (e.g., Liu and Dorn 1996) have been met with undue controversy.

Images produced during the Early Archaic show a considerable amount of consistency across the desert west, from the western slopes of the Rocky Mountains to Owens Valley, California. Designs are typically complex abstract geometric compositions, implying a high degree of improvisation (Figure 2a). In the Great Basin, the prevailing paradigm

Late Precontact Timelines

Northern Rio Grande	<… Late Archaic (1500–600 BCE)		|<-- Rio Grande Ancestral Pueblo (600-1600 CE) -->|				Spanish Colonial (1598-1821 CE)	Mx *	Am **
			Developmental Period (600 – 1100 CE)		Coalition Period (1100 – 1300 CE)	Classic Period (1300 – 1598 CE)	Pueblo V/Historic Pueblo (after 1598)		
Colorado Plateau	<… Basketmaker II (1500 – 500 CE)	Basketmaker III (500 – 750 CE)	Pueblo I (750 – 900CE)	Pueblo II (900 – 1150 CE)	Pueblo III (1150 – 1350 CE)	Pueblo IV (1350 – 1600 CE)	Spanish Colonial (1598-1821 CE)	Mx *	Am **
							Pueblo V/Historic Pueblo (after 1598)		

*Mx = Mexican National (or "Rancho") Period, 1821-1848 **Am = American Period (includes territorial and statehood) after 1848

Figure 1. Graphical table of later time periods, contrasting the Northern Rio Grande with the Colorado Plateau. Paleoindian and Early Archaic have been omitted.

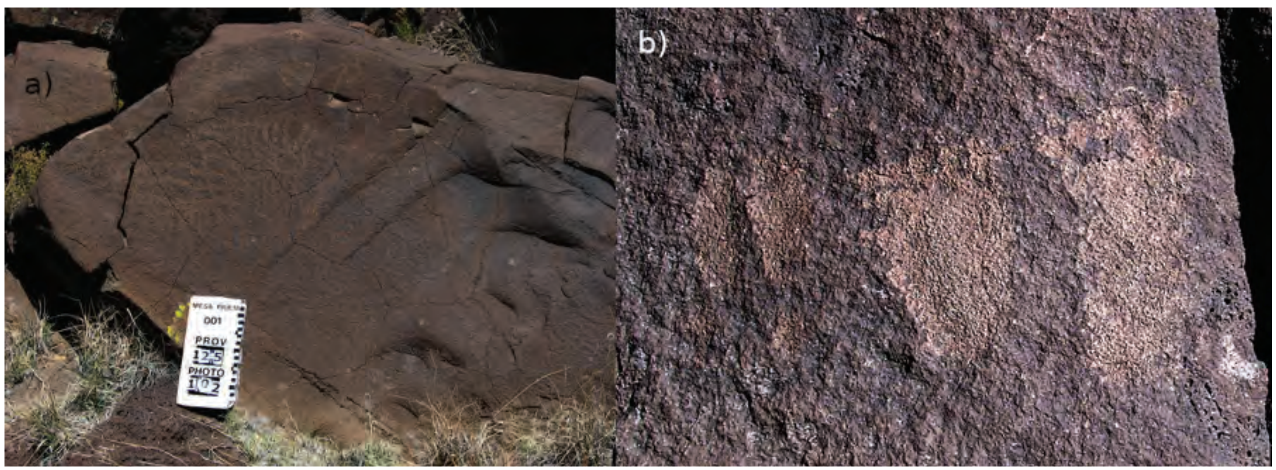

Figure 2. Examples of images from (a) the Early Archaic, and (b) the Late Archaic.

has been to categorize these images as either "rectilinear" or "curvilinear" abstract forms, with the former sometimes presumed by some (e.g., Heizer and Baumhoff 1962) to be earlier. In neighboring regions, including the plateaus of the Southwest, strikingly similar designs are virtually universal among the petroglyph panels presumed to date to this period. This wide-reaching similarity led some (e.g., Schaafsma 1980) to classify Early Archaic images of the Southwest and Great Basin as one in the same. Sometimes referred to as the Great Basin Abstract Style, these early intricate and abstract geometric forms are attributed to the Western Archaic Tradition (e.g., Schaafsma 1980).

Complex, intricate, and abstract forms stylistically linked to the Western Archaic Tradition are known in prominent positions at Mesa Prieta. Heavy to full patination in addition to the motifs described above are the primary criteria for inferring an Archaic origin of any particular panel or part thereof, although stylistically Archaic projectile points have also been identified on the escarpments. Despite some large, prominent, and decidedly Archaic panels, their distribution is rather sparse and their frequency low. Accounting for only sampling biases against more ephemeral marks (e.g., scratches and light pecking), current estimates are that no more than 5 percent of petroglyph panels contain firmly Archaic components, with even fewer of these comfortably from the Early Archaic. MacKenzie and Bourduin (2019) provide the following subcategories to describe most of the Early Archaic designs: linear meanders (complex curvilinear designs), branched lines and ladders (often rectilinear), grids and net-like patterns (may or may not combine rectilinear and curvilinear forms), discs, cupules, grinding slicks, and other patterns (rayed circles, very thick lines, and rock edge enhancement).

Late Archaic. By the Late Archaic (1500 B.C. to 600 A.D.), regionalization began to develop in rock art motifs in the desert west. In what is now Utah, the distinctive Barrier Canyon and Glen Canyon Linear styles emerged (Schaafsma 1992:35). The Late Archaic roughly corresponds to the Great Basin's Newberry Period (Schneider et al. 2000) and the Mojave Desert's Gypsum Complex (Sutton et al. 2007), during which the Coso Representational Style (Heizer and Baumhoff 1962) emerged out of the Desert Archaic Tradition. At Mesa Prieta, the range of petroglyphs thought to originate from the Late Archaic Period broadened to add some of the first iconic designs to the visual lexicon (Figure 2b). These new designs were largely types of tracks, especially ungulate tracks, but also those of birds, human feet and sandals, and so-called bear tracks with occasional polydactyl variants (Mackenzie and Borduin 2019). It is important to note that these designs appear to have persisted into early Pueblo (Developmental and Coalition) times. If that inference is correct, then the continuity of Late Archaic design elements into at least the Developmental Period at Mesa Prieta supports Steen's (1983:169) supposition that "along the upper Rio Grande, a small stable population developed from an Archaic Base."

Ancestral Pueblo

The onset of the Pueblo timeline along the northern Rio Grande began much later than in areas to the west and north, earning this region its own distinctive archaeological chronology. The persistent use of pithouses by small populations well past the onset of the Colorado Plateau's early pueblos has erroneously earned the Northern Rio Grande a reputation as a cultural backwater (Fowles 2018). Instead of this flawed stereotype, scholars like Fowles argue for understanding the Northern Rio Grande as an area in which occupants and migrant groups adapted to social and demographic shifts as well as to environmental factors.

Developmental Period. Between the close of the Late Archaic and the onset of roomblock style pueblos in the area were several centuries of transition, the so-called "Latest Archaic" as Post (2002) quipped. As pithouse architecture and semi-sedentary lifeways persisted between 600 to 1100 A.D., it should be no surprise that some continuity in rock art designs is also found. Design continuities in Northern Rio Grande rock art between the Late Archaic and "Latest Archaic", a.k.a. the Developmental Period, when contemporaneous Chaco Canyon was constructing monumental great houses, have resulted in a profound research bias against the Northern Rio Grande region during this time period (Fowles 2018). In line with the positions of Post and Fowles, I argue that the continuity in designs (and even continued low frequencies) between the Late Archaic and Developmental Periods at Mesa Prieta represents the resilience of cultural identity for a likely nomadic or semi-nomadic local population that nonetheless maintained economic contact with, and derived inspiration of select motifs from, sedentary agriculturalists to the west.

At Mesa Prieta, icon-derived imagery such as human figures, faces, animals (Figure 3) and implements/artifacts increases for Pueblo periods, adding to a repertoire of figurative designs that already included tracks of humans and ungulates. While obvious hunting imagery is rare to lacking, both game animals (ungulates) and hunting weapons are depicted. Whether these were created during the Developmental or later periods remains a question as no associated habitation features have been unambiguously identified and excavated on the mesa. Comparing the levels of patination between different panels without rigorous (and destructive) geochemical and/or petrographic analysis yields unreliable results, but these designs do tend to have slightly higher levels of patination than the more ubiquitous Classic period designs. Because of precautions and uncertainty, it is most prudent to divide Mesa Prieta's Pueblo petroglyphs

Figure 3. Ancestral Pueblo petroglyph, deeply pecked, depicting a stylized quadruped.

into two periods: Early Pueblo, encompassing both the Developmental and Coalition Periods, and the Classic Period.

Coalition Period. For the Chama River/ Rio Ojo Caliente pueblos at the foot of the west escarpment of Mesa Prieta—namely Ponsipa-akeri and Sandoval—archaeological evidence from pottery sherd frequencies and the scale of architecture indicates that populations remained low in the Coalition period until the cusp of the transition to the Classic period (Duwe 2019; Ortman and Davis 2019). The pueblos of the Chama River and its tributaries likely predate the Rio Grande pueblos of Ohkay Owingeh and Phioge along the east escarpment. This means that significant differences in style, subject matter, or technical execution of petroglyphs between the west and east escarpments could be used to infer chronological differences between Coalition and Classic period designs.

Unfortunately, a number of factors complicate this. First, the topography and geological substrates differ between the two escarpments, with the east side exhibiting a gradual incline of natural benches topped with outcrops of the basalt capstone, while the west escarpment is much steeper, less wide, and dominated by soft limestone. Second, the MPPP's survey coverage to date is highly biased towards the east escarpment, in part due to pragmatism and in part because of an expectation by several successive project archaeologists that the west escarpment is largely not suitable for petroglyphs. Third, were any differences to be found they would need to be disentangled from the potential distinctions between residential communities, as Ponsipa-akeri was occupied well into the Classic period as well (Duwe 2019). The matter of Coalition period use, communities, and iconography at Mesa Prieta remains an open and largely unexplored question.

Classic Period. Based on style, qualitative evaluations of repatination, and associations with pottery fragments, the vast majority of Mesa Prieta's petroglyphs—roughly 75-80 percent—are believed to date to the Classic period (1300 to 1598 C.E.). Classic period images are dominated by iconic motifs (in the semiotic sense), including people, animals, and objects. In the first half of the fourteenth century, populations in the Northern Rio Grande area and particularly along its tributary, the Chama River, began to boom, largely as a result of the influx of agriculturalists leading to increased food productivity that further fueled population growth (Ortman and Davis 2019). Ortiz (1969) recounts an origin story from Ohkay Owingeh in which the two seasonal clans—summer and winter—migrated southward to found the northern Tewa pueblos. This oral tradition is largely thought to record the outflow of Pueblo III populations from the greater San Juan drainage south and east to the Rio Grande (Cameron 2006). This is not the only such story, however, and Tewa author Tessie Naranjo (2006) shares an account of her ancestors arriving at Santa Clara Pueblo from the Galisteo Basin area via Puyé. It seems that community formation and ethnogenesis during the Classic period was not a simple unilineal process. Classic period contributors to the visual and material culture at Mesa Prieta, while largely linked to migrating agriculturalists, also had family ties to other parts of New Mexico, and given the Early Pueblo (Developmental and Coalition periods) evidence, likely also to the "Latest Archaic" semi-nomadic hunter-gatherers of the area.

One prominent theme in Classic figurative motifs is the depiction of implements of hunting and violence. Weapons, archers, projectile point designs, shields and shield bearers, and metaphorical references (e.g., mountain lions) are common on Mesa Preita, especially on the lower third of the east escarpment (Figure 4). Interestingly, the proportion of such martial imagery at Mesa Prieta compared to the Pajarito Plateau and other areas is significantly lower (Schneider 2019). Schneider (2019) interprets these low rates to indicate the martial imagery that does exist as functioning in some capacity other than to record violent events, most likely as an expression of ideology. Supporting Schneider's findings, multi-

Figure 4. Martial imagery conveying the "shield bearer" motif. Both elements combine pecking and scratching techniques to depict details, including handheld implements, legs, and ornaments.

element compositions laden with martial imagery (Figure 4) indicate ceremonial events, including processions.

Some of the most renowned and iconic images from Mesa Prieta are the unusually prolific flute player motifs, especially animal flute players. Flute players are not evenly distributed on the landscape. Instead, they cluster on steep (greater than 35°) slopes and are not found on free standing boulders in flat areas. Presently this association is hypothesized to indicate a strong association between the depiction of musical instruments and spaces which reflect sound in novel ways (e.g., strong echoes, possibly reverberation), however further testing is needed. Acoustical effects are a matter of ongoing study, and are expected to articulate with discourses on ceremonialism and neuropsychology in rock art.

Flute player images fall into three subcategories: anthropomorphic, zoomorphic, and therianthropic (Figure 5). The significance of the zoomorphic flute players is unclear, however associations with oral traditions seem likely for some. Therianthropic figures featuring both human and animal characteristics (e.g., Slifer 2000:88, Figure 92) may be linked to ritual transformations such as those common in shamanic religious traditions. Anthropomorphic flute players nearly invariably feature a "humpback," and may often be phallic, supporting associations with fertility imagery (Slifer 2000:85-89). In this manner, at least some if not all of flute player images at Mesa Prieta are examples of a broader trend of both explicit and metaphorical expressions of fertility imagery. Sprouting seeds, genitalia, copulation scenes, and figures with "fertility humps" are all common

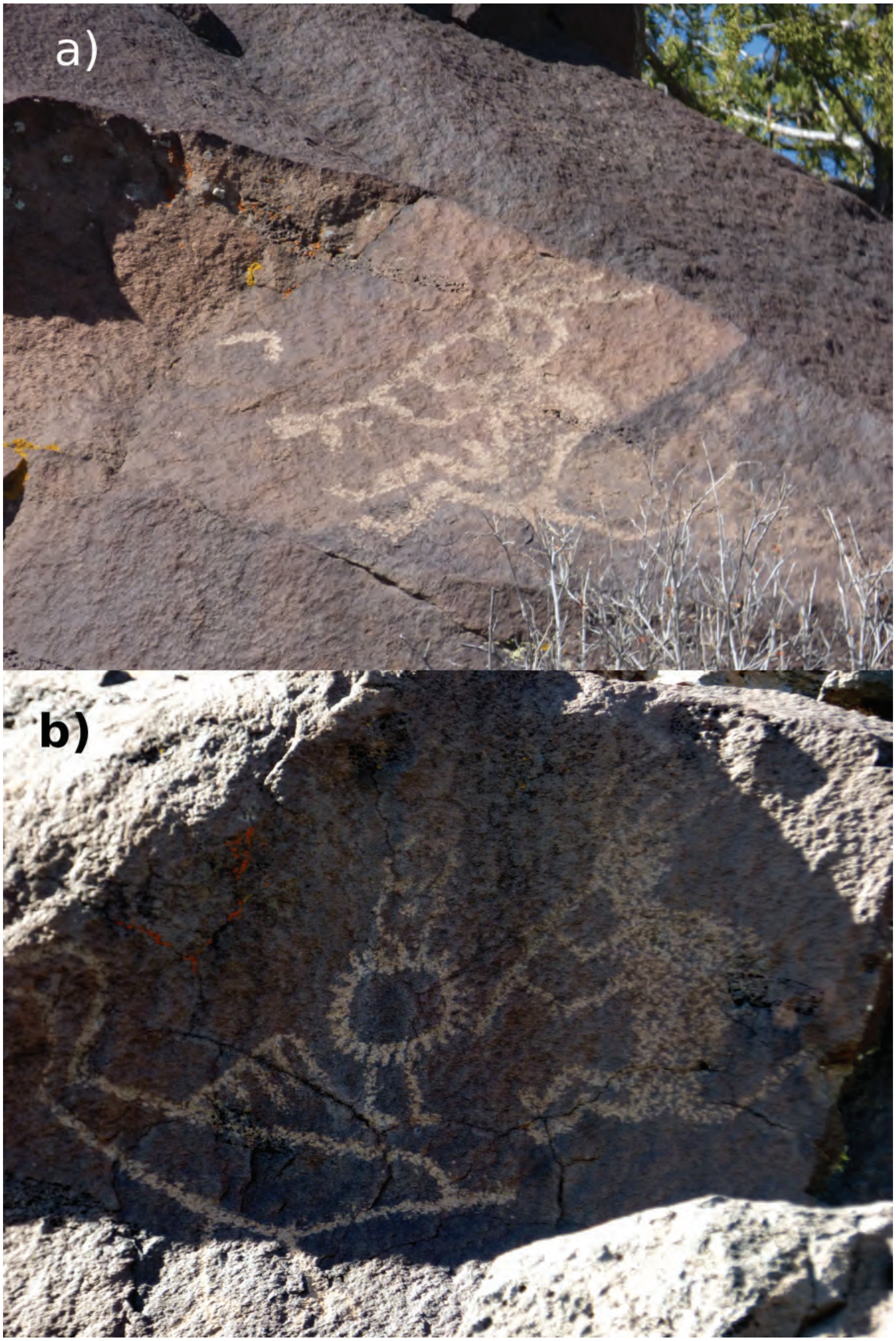

Figure 5. Examples of therianthropic flute players with human limbs, a "fertility hump" on their backs, and long tails.

Classic period motifs at Mesa Prieta. Examples of these are featured in several publications, including several shared by Slifer (2000:45, 57, 88, 92, 106, 153, and Plate 11). The frequency and prominence of fertility themes should be further explored in future at the mesa.

Post-Contact Periods

European contact and the beginnings of colonization of the region are generally marked at the arrival of Juan de Oñate in 1598, over half a century after the onset of contact in the Albuquerque basin. Interactions between indigenous and colonial-settler groups remained complex for centuries. Many New Mexico pueblos inhabited at the time of initial contact are still inhabited today, the closest of which are Ohkay Owingeh and Santa Clara Pueblo (Tewa), and Picuris and Taos (Tiwa). The continuation of Pueblo communities and traditions in the face of settler claims has led some to adopt the term Pueblo V for the period from 1600 C.E. to today, but even this term does not fully encompass the many expressions of Indigenous sovereignty. In addition to the arrival of Euroamerican settlers, the Northern Rio Grande also saw more frequent interactions with increasingly mobile non-local Native Americans, especially Jicarilla Apaches and Comanches (Fowles et al. 2017). Scratched style equestrian designs (Figure 6) may be from Comanche visitors to the mesa and are not consistent with Pueblo carving techniques.

Nonetheless, colonization significantly contributed to profound economic shifts, increased population mobility, and escalating violence. These processes began during the Spanish Colonial period (1598-1821), roughly contemporary with the Mission period in regions like California. During this time, the Catholic church aggressively spread its influence, shaping religious traditions and ideals that are emblematic of New Mexico today. This

Figure 6. An uncommon equine image executed with an atypical scratching technique.

ideological shift indelibly changed the religious iconography at Mesa Prieta, where an estimated 3,500 instances of crucifixes (in several variants) have been recorded to date (Figure 7). The context of crosses is also interesting, as they are presumed to be associated with the perimeters of, or trails to, pastureland on the flatter benches of the east escarpment. Mesa Prieta saw significant domestic sheep and goat grazing from the seventeenth through nineteenth centuries. The pastureland associations are substantiated by presumptive livestock brand motifs (Figure 8). These images often correspond to conflations of letters and/or share formal similarities with later brands registered during the New Mexico Territorial period. Like many crucifixes, their pastureland context on and along the aforementioned benches. One last Colonial influence during this time, and somewhat unique to Mesa Prieta, is the appearance of a handful of Spanish heraldic lions (Figure 9).

The collision between Indigenous and Colonial worlds could not be more apparent than at Mesa Prieta, which was at the epicenter of one of the most momentous events in post-contact New Mexico, the 1680 Pueblo Revolt. Organizer Popé hailed from Ohkay Owingeh, seated right at the southern terminus of the mesa. To time the revolt, knotted segments of yucca cordage were distributed among the pueblos, with one knot untied each day to provide a countdown. The revolt itself, and the Spanish counter-offensive in 1692, spawned substantial violence. While MPPP and I do not have sufficient evidence at present to conclusively associate any particular panels to the Pueblo Revolt with certainty, many panels with relatively light repatination depict scenes with iconography reminiscent of the story of that event, as well as the overall trends in violence during this time. Ortiz (1969) describes scalp trophies as a symbolically important part of Tewa warfare, a practice which

Figure 7. Variations on the Christian cross motif.

Figure 8. A presumptive livestock brand pecked into a small stone and placed sideways on top of larger stones. This motif is ubiquitous in an area once suitable for grazing.

might be depicted in the panel in Figure 10. In another example, Figure 11, an outlined human holds a length of circular dots, reminiscent of knotted cords like the one described in the story of the Pueblo Revolt.

The briefest period in the settler-colonial timeline is the Mexican period (1821-1848), often referred to as the Rancho Period in California because during this time the Mexican national government secularized the powerful Catholic missions and redistributed the land to its more privileged citizens. Perhaps the most significant event for New Mexico during this time was the Mexican-American War, which ultimately led to New Mexico being ceded from Mexico and annexed by the United States. Once again Mesa Prieta was the seat of resistance, as "Nuevo Mejicanos" faced off against U.S. federal troops in a conflict that would be named the "Battle of Embudo" (McNierney 1980). Mesa Prieta was denoted as "high table land" in a 1948 map of the conflict (McNierney 1980:70). While no explicit iconography of this event has been identified, numerous bullet marks are present on boulders in the immediate area of the Battle of Embudo (although these may just as likely be marks from later recreational firearm practice). Private landowners in the vicinity frequently report recovering artifacts of the battle.

Figure 9. One of the less frequently seen Spanish heraldic lion designs. This design appears to merge the styles of Ancestral Pueblo petroglyphs with telltale European heraldic forms.

Figure 10. A panel with two pecked anthropomorphs, one on horseback. The standing figure to the right is holding two objects, with the infilled and raised object elaborated on with many fine scratches giving the impression of hair on a head or scalp.

Figure 11. Ancestral Pueblo image from the Wells Petroglyph Preserve of a person holding a beaded or knotted chord.

Concluding Remarks

Much of our knowledge of this exceptional landmark is owed to both archaeologists and avocational citizen scientists who have dedicated their time, often without compensation, towards recording and preserving Mesa Prieta. Archaeological interest in the petroglyphs began with regional surveys about a half century ago, however at the time much of the mesa was in private hands and unprotected. Strides towards preservation have only been made in more recent decades thanks in large part to outreach and public education programs. Spearheading this, Katherine Wells has ensured the preservation of 188 acres through a donation to the Archaeological Conservancy of some of the most petroglyph-rich acreage. Much remains to be protected in perpetuity, however, and only through scholastic interest and disseminating the results of these research projects through public programming and engagement can more of the 32,000-acre mesa be moved towards protection.

In the previous discussion, I have related Mesa Prieta to several significant historic events, as well as to every period of human occupation in what is now New Mexico. This landmark exemplifies a location prone to repeatedly influence the history, ecology, and ideology of its resident populations over great time despite demographic shifts, what Schlanger (1992) called a "persistent place." Mesa Prieta is uniquely emblematic of New Mexico, its dramatic geography, and every phase of its history. It also remains tied to the "big picture" academic questions of deep time, the peopling of the American interior, human ecology, processes of ethnogenesis, colonialism and resistance, and religious syncretism. While these densely theoretical topics are beyond the purview of the paper at hand, it is my hope that the information provided facilitates future interest into how Mesa Prieta and its immediate surroundings can contribute to those conversations.

Data Availability Statement

This paper references petroglyph records on file with the Mesa Prieta Petroglyph Project, a 501(c)(3) not-for-profit organization. The Mesa Prieta Petroglyph Project supports outside scholarship. Records are regularly provided to the Laboratory of Anthropology. All petroglyph records, including physical and digital archives, are available to credentialed scholars through either institution.

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The *Langrage* of Conflict: Warfare, Walls, and Weapons at the Pueblo of Kuaua/Pueblo de la Cruz (Bernalillo, New Mexico)

CLAY MATHERS

Understanding the *langrage*[1] of conflict has been a consequential issue for human communities long before it became the scholarly focus of archaeologists and others. Despite the widespread nature of military confrontations in the Americas throughout the Early Historic period, our knowledge of Indigenous and European conflict during this time remains very modest. Indeed, many archaeological and other perspectives on Early Historic warfare continue to rely heavily on rather biased and problematic colonial documents. Indigenous-European conflict was both common and consequential in the sixteenth-century Americas, but its nuances have often been overlooked. As a result, modern anthropological analyses of warfare in the Americas during the Early Historic era still have much to tell us about Indigenous and Colonial activity.

The recent discovery of Vázquez de Coronado military assemblages at the Pueblo of Kuaua (also known as the Coronado Historic Site and LA 187) in Bernalillo, New Mexico, allows us to explore the langrage of battle in a more comprehensive fashion (Figure 1). While documents have been instrumental in linking Kuaua with the historically documented attack on the Pueblo de la Cruz—a site besieged by a segment of the Vázquez de Coronado expedition in early 1541 (Mathers 2020)—in this discussion, archaeological evidence is the central focus. Three interconnected themes will be explored:

- warfare (*concepts of conduct, strategy, and tactics*);
- walls (*architecture and its spatial/ environmental setting*); and
- weapons (*the portable and material accoutrements of conflict*).

The unusual character of New Mexico's earliest Indigenous-European warfare derives from the extended occupation of the Vázquez de Coronado expedition in the Tiguex region of the Middle Rio Grande Valley. In this paper, a comparison of Early Historic warfare in the Americas points to some of the features that make the Tiguex conflict distinctive. Interim results from the ongoing Kuaua Environs Survey (KES), an archaeological project begun in 2017, will then be used to illustrate how a focus on warfare, walls, and weapons can enhance our understanding of conflict in Late Prehistoric and Early Historic New Mexico.

Warfare

Early Indigenous-Colonial Conflict in the Americas

Sixteenth-century military engagements in the Americas varied widely with respect to scale, duration, and intensity. Well-known *conquista* campaigns in regions such as highland Peru and the Valley of Mexico represent definitive cases of large-scale and sustained warfare. These major contests can be distinguished readily from smaller

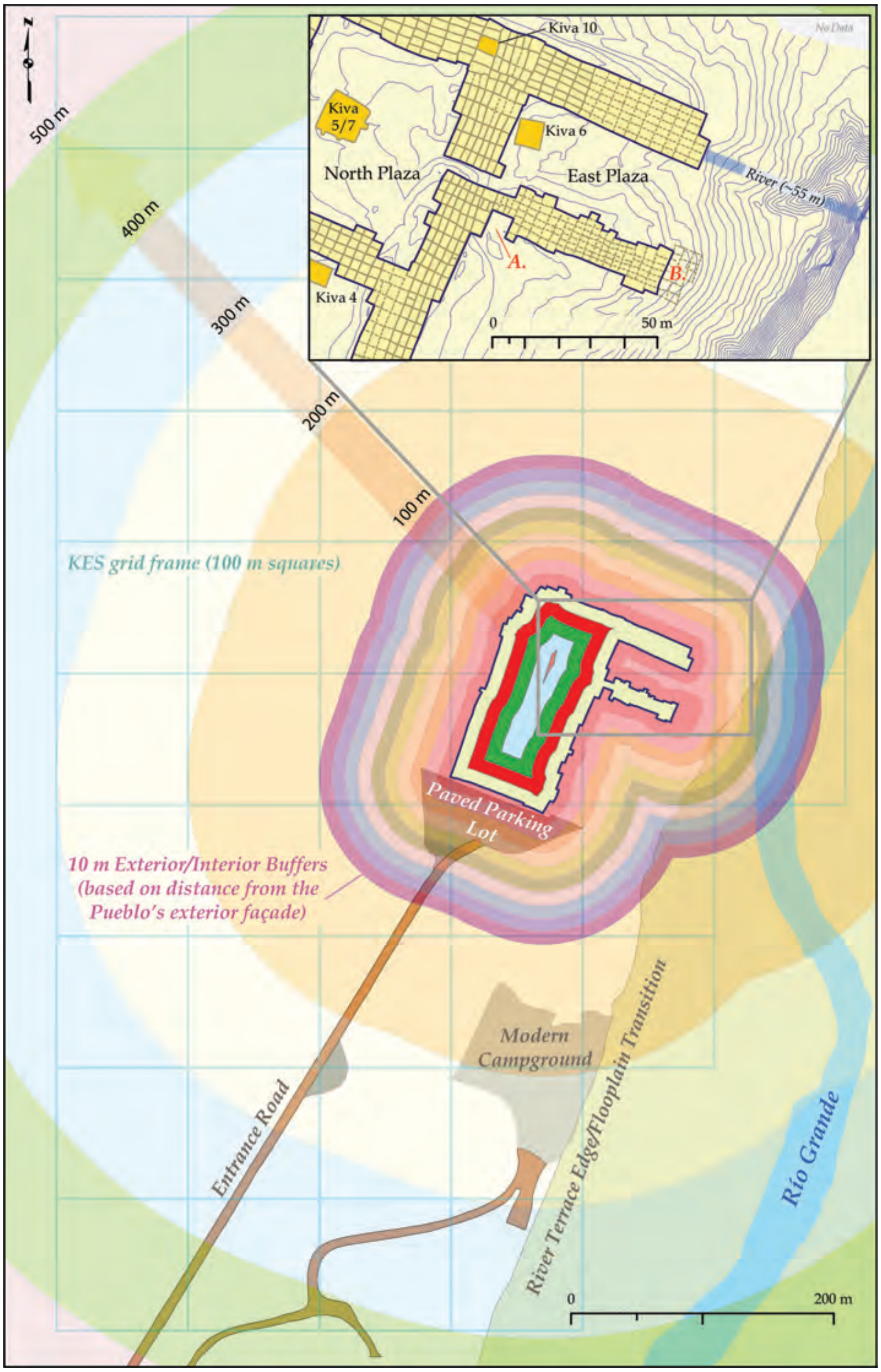

Figure 1. Major elements of the Kuaua Environs Survey (KES) 2017-2020, including the overall grid pattern, 100-m exterior buffers, and 10-m exterior/interior buffers—all based on distances from the exterior façade of the pueblo—and a generalized plan map of the pueblo. (An inset map is also included, based on data from the Coronado Historic Site. The inset shows the primary entrance to, and exit from, the site, situated in the northeast quadrant of the pueblo. "A" designates the location of a false entrance on the southern (roomblock) arm of the northeast entrance, and "B" represents a dense concentration of personal equipment and missile weapons against the leading edge of the southern roomblock wall protecting the northeast entrance-exit, suggesting other rooms farther east were added after the Vázquez de Coronado attack in 1541. All dotted wall lines are in this inset are rooms whose form and position are unconfirmed currently. Topographic contours (in blue) are represented at 1-ft intervals.)

episodes of conflict involving modest numbers of personnel and resources and shorter periods of combat. Furthermore, smaller conflicts were often focused on more expedient objectives (e.g., personal revenge, captive taking, or limited food supplies) as opposed to larger strategic aims (such as dominion over Indigenous lands and their inhabitants).

Spanish-led *entradas* frequently encountered armed resistance from Indigenous communities, engaged them for a short period (usually a day or less), and moved rapidly on to other locales (e.g., García Loaeza and Garrett 2015:76-91; Mecham 1968[1927]:113-180; Toribio Medina 1934:167-242). Other *entrada*-related conflicts were larger and more sustained affairs and included a succession of major battles and protracted sieges (e.g., Chamberlin 1948:17-66, 1953:24-99; Restall and Asselbergs 2007).

Extended Indigenous-European warfare in the Americas took place where large-scale territorial dominion was at stake and where Spaniards and their allies confronted major Indigenous polities with their own well-established, well-supplied, numerous, and experienced armed forces. In such circumstances, protracted sieges often developed, such as those at Tenochtitlan in 1520-21 (Díaz del Castillo 2008:211-310) and Cuzco in 1536 (Himmerich y Valencia 1998). These large-scale conflicts focused on major Indigenous capitals and the control over their surrounding territories. Other sieges involved shorter individual battles, with fewer combatants. These more modest-scale sieges were often less concentrated in time and space. Examples include the *conquista* campaigns in Guatemala (Restall and Asselbergs 2007), Nueva Galicia (Altman 2010), and Yucatan (Chamberlin 1948; Restall 1998:3-28).

In the Middle Rio Grande Valley of New Mexico, the Southern Tiwa villages of Alcanfor, Alameda, Arenal, Moho, and Pueblo de la Cruz represent a succession of battles known collectively as the Tiguex War. This conflict took place over a period of a year or more, and represents the most spatially extensive and protracted Indigenous-European military conflict in sixteenth-century North America. The 1540-42 conflict in Tiguex also constitutes the greatest number of sieges north of what is now Mexico during the first century of European contact, and includes the single longest siege (the two-month contest for Moho) in this area and time period. So, the question arises, why was the Tiguex War such an anomaly in sixteenth-century North America?

Sixteenth-century Indigenous-European hostilities in New Mexico clearly represent a relatively small scale of conflict in nearly every respect. Nevertheless, the parallels between the Indigenous-European conflicts in Tiguex and those in Guatemala, Nueva Galicia, and Yucatan are notable. In the latter three regions, loosely confederated Indigenous communities attempted to defend themselves against Spaniards and their local and/or imported auxiliaries. In conflict with the Spaniards and their allies, these semi-autonomous groups often had to be confronted in a protracted, iterative fashion, such as the elongated military campaigns of Pedro de Alvarado in the Guatemala highlands. These operations were followed in short order by renewed conflict, before any meaningful bases for Spanish settlement were established (Restall and Asselbergs 2007:25-27, 56).

As the Spanish *entrada* leader Vargas Machuca (2008:23) pointed out in 1599, and Restall and Fernández-Armesto (2012:86) have reiterated more recently:

> One might assume that empires might fall less easily than small kingdoms, and thus the larger the polity, the more trouble it gave the Spaniards. Counterintuitively, the opposite was the case. Because if [sic] the complex nature of native disunity, the large empire of the Aztecs fell after a two-year war, the dominant kingdoms of Guatemala came under Spanish control after five years of

bloodshed, and the dozen small polities of Yucatan were "pacified" after twenty years of invasions.

More distributed forms of Indigenous authority, as in Tiguex, helped to ensure Colonial military campaigns seldom came to an end through a single, or limited number, of key battles. Early historical accounts of the social organization of Middle Rio Grande Pueblos (Chapman 2013), archaeological evidence from mortuary contexts in Tiguex (Mathers 2019:318-324), and modern studies of Southern Tiwa political and authority structures (Brandt 1979:347-348; Ellis 1979:361-364; Ware 2014:50-51) all suggest that, historically, community powers in Tiguex were invested in a variety of different roles, groups, and individuals. These more democratized and overlapping social controls contrast markedly with the authority structure of state-level polities and paramount chiefdoms.

Other historically contingent factors help us to understand some of the multiple catalysts for extended conflict and sieges in Tiguex. These catalysts include:

- The large size of the Vázquez de Coronado *entrada* (approximately 3000 people and 7000 animals) and the lethal resource demands imposed on Indigenous communities to regularly provision this expedition.
- The establishment of Vázquez de Coronado's base of operations in Tiguex in the late autumn/early winter of 1540—that is, during a period outside of the local growing season—ensuring that the burden of supplying the expedition during this time would fall almost exclusively on Indigenous food and other stored reserves.
- Failure of the Vázquez de Coronado expedition's naval contingent to arrive with supplies of winter clothing and other needed equipment/provisions.
- The relatively cold conditions during the winters of 1540-41 and 1541-42 (Van West et al. 2013:91, Figure 5.2A), prompting the Spaniards and their Mexican auxiliaries to appropriate, often by force, critical resources such as dwellings, blankets, and cached food supplies from Indigenous communities.
- The expedition's limited alternatives to the Tiguex area, as evidenced in the 1541 letter from Vázquez de Coronado to the Spanish king (Flint and Flint 2005:321) indicating that Tiguex was the best land within an approximately 500-mile zone of their initial base camp in the Zuni region.

These comparative data provide a useful background but fail to explain why conflicts and battles in Tiguex consistently developed into sieges and why relatively modest-sized Southern Tiwa pueblos successfully resisted a larger Spanish-Mexican force for such extended periods. The emphasis on warfare, walls, and weapons in the following sections illustrates how archaeological data can contribute to these questions and to our understanding of early Indigenous-European conflict.

Concepts, Strategies, and Tactics

As historians have emphasized, the sixteenth century was a time of considerable change in military practice, both in the Old World and in the Americas (Agoston 2005; Andrade 2016; Sharman 2019). When the Vázquez de Coronado *entrada* entered Northern New Spain in 1540, three major military traditions converged: European, Native American, and Native Mexican. A brief outline of these military cultures is helpful in understanding the Tiguex conflict and the archaeological record they left behind.

Europeans: Unlike the armed forces of European states, *conquest companies* or land-based privateers contracted by the Spanish Crown throughout the sixteenth-century were self-financed proxies. Since the financial benefits of Crown-sanctioned *entradas* only accrued if and when there were large, long-term cash benefits for the state, these conquest companies—like contemporary privateers on the high seas—focused primarily on acquiring portable wealth.

In the sixteenth-century Americas, Spaniards continued many frontier traditions developed over eight centuries during the *Reconquista* in Iberia, including recruitment of allies, hostage taking and selling, ambushes, siege warfare, post-battle retaliation, and all manner of tactics necessary for victory, but often very far from the ideal of medieval knightly honor. Most importantly, perhaps, the medieval practice of granting *repartimientos* and *encomiendas* (land and labor/tribute, respectively) for military service spread widely in the sixteenth-century Americas. Designed originally to secure and maintain frontier areas against the Moors, these grants were adapted to compensate self-financed *conquista* companies and their participants across the New World. And as Chamberlin (1970:146) has pointed out: "…certain of the greater conquistadors, as royal officers, secured native auxiliaries and burden bearers from the towns they held in encomienda and…levied tributes in these towns specifically for the purpose of meeting the costs of expeditions of discovery and conquest."

While documents connected to the Vázquez de Coronado *entrada* indicate large numbers of Mexican auxiliaries took part in this expedition, archaeological analyses of battlefield and residential contexts, to date, in Tiguex have failed to produce any substantial amount of distinctive Mexican material. Diagnostic objects such as green Pachuca obsidian, *macana* and *macahuitl* blades, and Mesoamerican projectile points have been rare or absent. Consequently, these data are at odds with the large number of Mexican auxiliaries known to have participated in this *entrada*. Elsewhere, I (Mathers 2019) have suggested that this faint signature in battle-related archaeological assemblages, to date at least, does not suggest a passive or inactive role for Mexican auxiliaries in the Tiguex War. Instead, it may reflect difficulties in employing Indigenous forces in military operations such as sieges where a complex choreography and coordination of forces were required. Such operations would have been complicated by issues of mutual intelligibility (language differences) and contrasting military traditions (see below).

Archaeological evidence from Kuaua and elsewhere in Tiguex suggests that Spanish military tactics had deep roots in earlier military campaigns such as the Crusades and the Iberian *Reconquista*, and at the same time were undergoing profound changes in the Late Renaissance. In particular, the Italian Wars (ca. 1490-1526)—a series of conflicts involving warring states from northern Europe to the Mediterranean—had a major impact on traditional strategies, tactics, and weapons used by Europeans and others throughout the Old World and the Americas. For example, as shoulder firearms became more prevalent and effective, greater numbers of European commanders were successfully targeted and killed in battle (Figure 2). And as siege artillery was refined and made more lethal, major changes were made to defensive architecture, shifting the preference for medieval fortifications with high walls to more impact absorbing and less vulnerable earthwork defenses.

As the range of approaches and weapons expanded significantly in Early Historic Europe and elsewhere in the Old World, conquest companies had a wide variety of options to employ against Indigenous Americans and very few constraints on how or when to deploy them. The broad array of tactics and weapons that might have been familiar to those who had fought on either side in the Crusades, the Iberian *Reconquista*, or the Italian Wars would

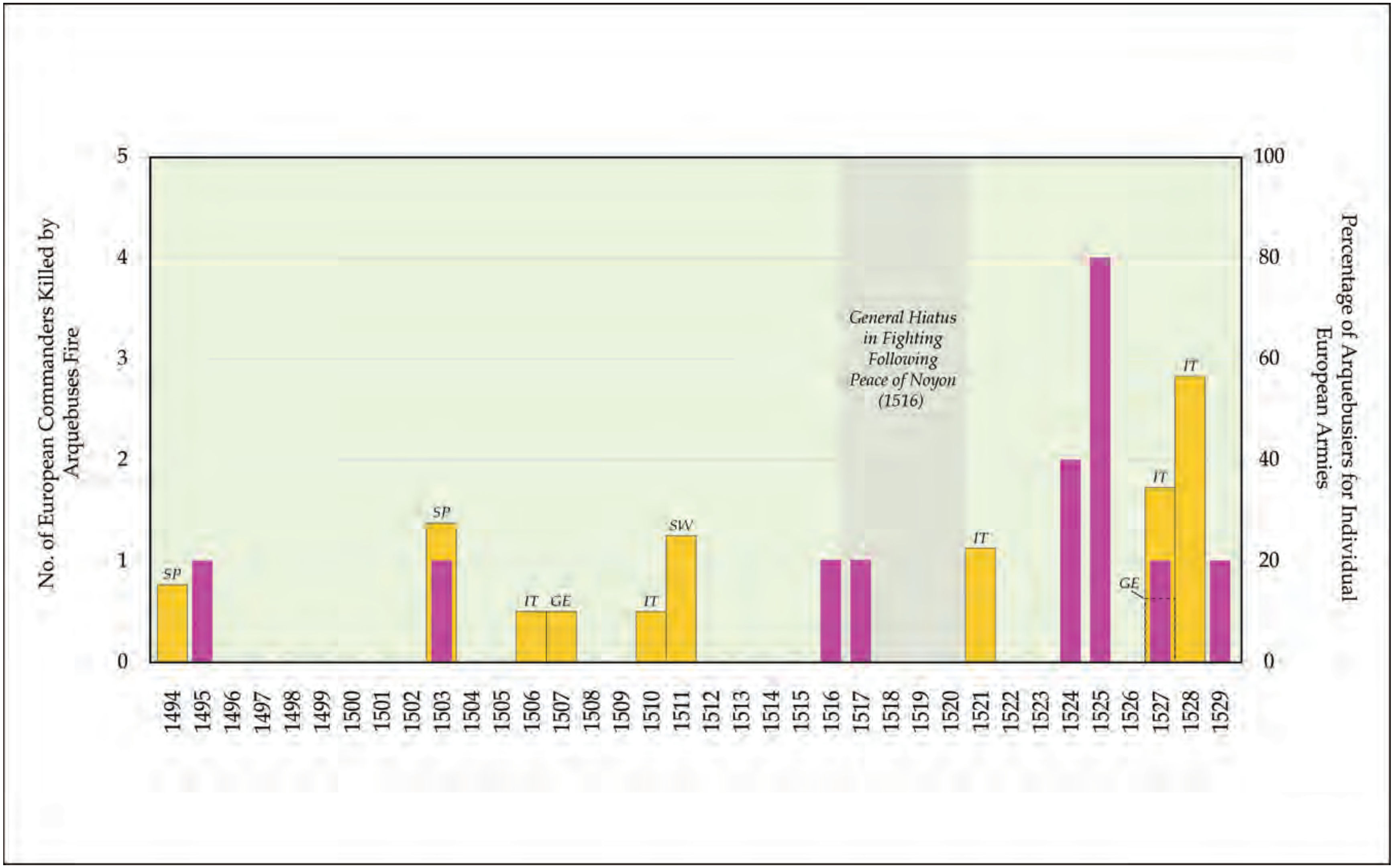

Figure 2. Number of major European commanders killed by arquebus fire ( ) and the percentage of arquebusiers for individual combatant armies ( ) (Italian Wars 1494-1529). (GE = Germany; IT = Italy; SP = Spain; SW = Switzerland) (after Taylor 2006).

be entirely novel to their New World opponents. Even when Indigenous communities had experience in confronting specific European weapons such as cavalry (and in Tiguex, the succession of battles provided precisely that type of experience), their armed forces faced formidable challenges in conflict with early European expeditions. The latter could employ a wide variety of weapons and an equally varied spectrum of tactics developed over centuries of continuous warfare.

Archaeological materials from Kuaua Pueblo and the nearby Tiguex settlement of Santiago Pueblo (LA 326), both of which were attacked by the Vázquez de Coronado expedition, display signs of how *entrada* military personnel, tactics, and weapons were adapted to local conditions. First, it is clear that shoulder firearms were not only a formidable weapon in open field combat, but could be adapted with lethal effect in attacks on fortifications and in siege warfare. There is a close correspondence between small caliber lead shot and proximity to the extramural façades at Kuaua (Figure 3), Santiago (Mathers and Marshall 2020:39, Figure 2.2), and Piedras Marcadas (Mathers et al. 2008) pueblos. These patterns suggest that in Tiguex battles arquebuses were used in close quarter combat to fire multiple balls in a shotgun or scattershot fashion, specifically using one large primary ball, together with several smaller ones. Also, the close proximity and tight clustering of arquebus shot and copper crossbow quarrels at both Kuaua and Santiago suggests that the differences in accuracy, at least within about 50 m (165 ft) of the pueblo, may have been minimal. The combined use of accurate, standoff missile weapons of this type is consistent with descriptions of the "accurate shots of crossbows and arquebuses" at the Tiguex site of Arenal (Flint and Flint 2005:403) and the widespread Spanish tactic of targeting Indigenous leaders in open field combat and during sieges (e.g., Chamberlin 1953:89-90; Clayton et al. 1993b:238-240). While some experiments with early shoulder firearms suggest they were seldom capable of accurately placed shots beyond about 100 m (Krenn et al. 1995:105, Table 2), the archaeological record from Kuaua and Santiago suggests tight clustering of arquebus fire, as do episodes from the historical record describing Spanish battles and sieges ending with Native leaders felled by arquebus fire. Without contradicting the results of modern experiments, analyses focused on the performance of individual weapons (such as a single matchlock or arquebus) may overlook tactics that involved the use of multiple firearms on a focused target. Massed fire concentrated on the highly visible battle flags and other regalia of Indigenous leaders and their entourage could have been successful, as they were at the 1520 Battle of Outumba, albeit not employing firearms (Berdan 2014:62, 310 Note 1).

Similarly, materials from Santiago Pueblo, derived from the 2013-2017 Santiago Environs Survey (SES), include both large caliber lead and ferrous shot, suggesting the close-quarter use of one of Vázquez de Coronado's six small bore artillery pieces (falconets or *versillos*). Other expeditions, such as the 1539-1543 Soto *entrada* in the southeastern United States, made use of similar weapons. These lightweight naval-style artillery pieces, also referred to as swivel guns or "murderers," were typically used in maritime combat to discourage the boarding parties of opposing vessels. Swivel guns sprayed a ship's gun decks with deadly showers of langrage: metal, glass, stone, and other shrapnel. By the early sixteenth century, many such weapons were creatively repurposed for use in terrestrial *entradas* as a form of mobile artillery that could be transported long distances inland. Archaeological examples of large lead shot, and possibly small nails and copper scrap, found in close-quarter contexts near the perimeter walls or in interior plazas at Kuaua, Santiago, and Piedras Marcadas, do more than confirm that these weapons were present and were employed in combat. They also demonstrate important details about the contexts in which these weapons were used, the types of combat with which they were associated,

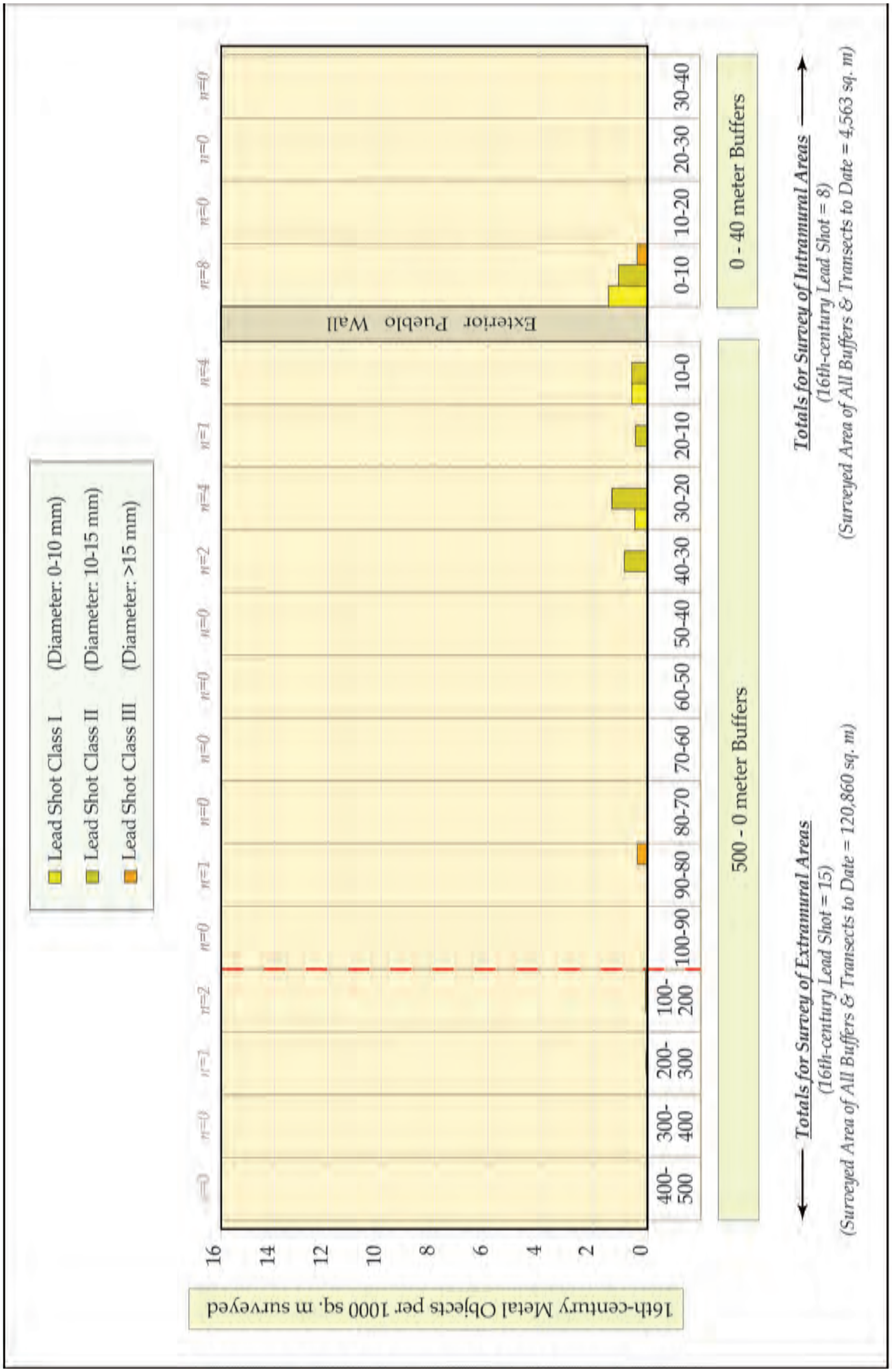

Figure 3. Normalized total of all sixteenth-century lead shot recovered to date from survey areas (0-500 m) outside of the exterior wall at Kuaua Pueblo (n=15), and all interior areas of the pueblo (0-40 m) inside the exterior wall (n=8). Lead Shot Size Categories from Steen (1988:181-186, 389-404) based on examples (n=388) from Spanish occupation at Santa Elena and Fort San Felipe, South Carolina (ca. 1566-1600).

and their efficacy. Historical and pictorial records of conflict, for all their value, often fall silent on such matters. Archaeological materials from Tiguex also emphasize the innovative nature of *entrada* military activities, such as redirecting shoulder firearms from their traditional use as a long-range weapon to more close-quarter combat, and transforming small-bore artillery from naval to terrestrial conflict.

Indigenous Mexicans: *Mexica* and other auxiliaries associated with the Vázquez de Coronado expedition were clearly not afforded equal status in the military affairs of this *entrada*. Indigenous participants joined the expedition for a variety of reasons, including reduced taxes/tribute, battlefield honors, enhanced status (among the Spaniards and/or their own communities), and knowledge of their new national leaders (culture, tactics, capabilities, weaknesses, and motivations) (Restall and Fernández-Armesto 2012:64-69). Many, but not all, were warriors and had received extensive and arduous years of training in the arts of war. And importantly, not all aspects of warfare and the achievement of prominent military positions were identical within Mesoamerica or even in Central Mexico (see Fargher et al. 2011). Although the *Mexica* and other Mexican Indigenous groups had developed concepts of warfare that were not wholly dominated by ritual and ceremony (Hassig 1988:95), there were, at some level at least, conventions of warfare widely understood by many Indigenous groups within Mesoamerica. Conflict with Europeans was different and without such shared understandings. These discrepancies in tradition and expectation often resulted in unanticipated deviations of military protocol and outcomes. Examples include the failure of Spaniards to announce the initiation of conflict via a formal declaration, and the preference of *Mexica* and other groups to capture, not kill, their enemies on the battlefield (Wise and McBride 1999:22-23).

Accommodating Indigenous groups and individuals with such varied traditions, experiences, social ranks, and languages would certainly have been a management challenge for Spanish expedition leaders. And the extent to which these challenges were met may have had much to do with how frequently and in what context Mexican auxiliaries were employed in military operations during the Tiguex War. Although Mexican expeditionaries were seldom mentioned in the documents associated with this conflict, we do know that "horsemen and many allies from Nueva España" were cited in reference to the smoky fires created in ground floor rooms at the Pueblo of Arenal during the battle there (Flint and Flint 2005:203). Other support roles that may have been filled by Mexican auxiliaries, requiring minimal European coordination or supervision, include archers, slingers, guards for horses, and personnel to gather food and fuel.

Native Americans: Early historical accounts of Indigenous-European conflict in the American Southwest are relatively sparse, but accounts of the 1540 battle of Hawikku, between elements of Zuni Pueblo and the Vázquez de Coronado *entrada*, refer to Pueblo defenders "arranged in units" to confront the expedition (Flint and Flint 2005:393). Following the battle of Hawikku, Zuni communities adopted a strategy employed by many other Indigenous groups in the Southwest and elsewhere in the Americas—that is, of avoiding direct combat and conflict by guiding Spanish-led expeditions "un poco más allá" (a little further on).

Other evidence of significant military organization and planning by Native Americans include killing "thirty-plus horses, mules, and beasts of burden" at the Southern Tiwa Pueblo of Arenal prior to the battle there (Flint and Flint 2005:403), killing Nahua auxiliaries, and wounding additional animals elsewhere (Flint 2002:238, 439). The threat posed by mounted Spanish soldiers appears to have been well understood by Pueblo communities in Tiguex, so the preemptive step against the Vázquez de Coronado expedition's horses, preceding the battle of Arenal, was no doubt more than simply a provocation. Instead, it was a necessary action to nullify the significant advantage of their opponent's military repertoire and *level the battlefield*. Other tactical maneuvers that aided Southern Tiwa defenders in the latter part of the Tiguex War were: to avoid open field combat, make use of pueblos with relatively compact perimeters, prepare caches of stone projectiles for protracted engagements, and where possible, engage the Spaniards and their allies on steep, broken terrain that made cavalry assaults as problematic as possible. These lessons were also learned by the Inca armies after a number of negative encounters with Spanish cavalry in open field combat and flat terrain (MacQuarrie 2007:146-147, 199, 216, 234, 252-254, 257).

Most importantly perhaps, the Pueblo communities' use of adobe walls and surface coatings for architectural dwellings and fortifications provided defenses that proved problematic to both Spanish *entrada* forces (Mathers and Marshall 2020:25) as well as their Mexican allies. As Hassig (1988:107) has noted, attacking *Mexica* armies who failed to enter an opponent's fortification directly through deceit or treason (e.g., by the disclosure of little known approaches to settlements or the presence of hidden entrances), faced three options: breaching the enemy walls, scaling them, or laying siege to them. As the Spaniards and their allies struggled with Indigenous defenses and weapons in the Tiguex War, all of these measures may have been employed, but only the last of these, sieges, seem to have succeeded. The sections devoted to fortifications and weapons below outline these circumstances in more detail, and help explain why protracted sieges were the norm, rather than the exception, in Tiguex—despite all the apparent advantages of the Vázquez de Coronado expedition.

Walls (and Terrain)

The nature of fortifications and the topography surrounding them have played a significant role since the beginning of warfare and the Tiguex conflict was no exception. In the Southwest, major changes in Pueblo architecture and site location—especially in well-studied regions such as the El Morro Valley of west-central New Mexico during the Late Pueblo III Period—signal important developments towards greater community emphasis on defense. These changes included dismantling and departure from settlements formed by large numbers of discrete roomblocks—frequently situated in positions offering minimal defenses (Late Scribe S Phase, ca. A.D. 1260-1270) and construction of substantially larger and more defensible settlements (Early Muerto Phase, ca. A.D. 1277-1288) "built around central plazas with high exterior walls formed by the outermost row of rooms" (LeBlanc 2001:31). Similar architectural forms appear in the Southern Tiwa region of the Middle Rio Grande Valley in the first half of the fourteenth century with the creation of pueblos such as Santiago and Kuaua (Eckert and Cordell 2004:166). The importance of these developments is that a number of defensive features were created at Tiguex sites prior to European contacts. And as Ware (2014:168) states:

> The Pueblos did not learn to build defensive villages that could withstand a siege of eighty days on the fly. They must have been schooled in institutionalized warfare long before the Spanish arrived, and it is unlikely that they learned such warfare in response to roving bands of Athapaskans. Athapaskan hit-and-run raids did not require village fortification, especially before the arrival of horses. It is much more likely, I think, that the Pueblo military abilities documented by the Spanish were due to established warfare among the Pueblos themselves.

A number of construction decisions and features developed by Pueblo communities in the Middle Rio Grande Valley in the period before European contact helped to blunt the considerable military advantages of the Spanish and Mexican forces commanded by Vázquez de Coronado. These architectural and terrain elements include:

Dense, Honeycomb Arrangements of Adobe Rooms and Roomblocks Forming a Solid, Defensible Perimeter with Limited Egress/Ingress: Adobe dwellings and defenses also had the significant advantage of making the use of fire arrows and fire setting problematic since wooden elements used in building construction were often covered rather than exposed. Spanish artillery had limited impact on these wood and earthen structures. In addition, the sandy soils and generally soft wood supplies in the Tiguex region made battering, tunneling, and undermining these forms of domestic/defensive architecture difficult.

Embrasures/Loop Holes and Towers: Expedition documents record that the upper tiers of Tiguex sites like Arenal and Moho had embrasures (Day 1940:101; Flint and Flint 2005:403), openings used by Southern Tiwa archers to launch arrows from protected positions. *Entrada* accounts also note that Moho had a number of towers with multiple loopholes; similar combinations of features were encountered, though not in combat, during the expedition's encampment near the Zuni Pueblo of Mats'a:kya in December 1540 (Flint and Flint 2005:401). Upper story exterior rooms at Kuaua and Santiago may have had similar defenses to expand the field of fire for archers. The impact of these features during the Tiguex War was noted by the eighteenth-century historian Matías de la Mota Padilla, using some of the now lost correspondence of expedition member Pedro de Tovar. In particular, Mota Padilla stated that the defenders of Moho:

> …resisted the blows of some makeshift battering rams, during which time much damage was done to our people by stones from the rooms and arrows from the loopholes. One soldier, attempting to plug up with mud a loophole from which much harm was being done, was shot in the eye…and fell dead…and as there were at short distances apart some little towers with many loopholes and embrasures, they did much damage, so that they wounded more than seventy… (Day 1940:101)

Narrow and Irregular Entrances: Archaeological evidence from Kuaua suggests the northwest entrance had a narrow, zigzag, angular form that would have frustrated any direct and rapid attack. This entrance appears to have been reinforced by adding a substantial number of river cobbles to its adobe construction, ensuring that it was not easily damaged or dismantled. The largest entrance at Kuaua, to the northeast, is situated on elevated ground, and is protected by two large east-west oriented roomblocks each measuring some 58 m (190 ft) long. Together with the main wall of the pueblo, these projecting roomblocks offered platforms for a three-way crossfire: north to south, west to east, south to north. Finally, the path from the river to the main entrance-exit to the pueblo proper is all upslope and indirect (diagonally-oriented across the East Plaza from the southeast terminal end of the north roomblock to the northwest proximal edge of the southern roomblock) rather than straight. Given the perilous nature of any attack on this area, it is perhaps not surprising that this portion of the site produced a large number of broken Vázquez de Coronado military objects. Archaeological evidence in the vicinity of entrance and exit ways at Santiago reveals similar high densities of Vázquez de Coronado military debris. These narrow openings, funnel-shaped in plan, are relatively wide at the exterior façade, and notably narrower towards the interior. The extant areas surveyed for the SES research indicates that both the southeast and southwest entrances-exits were protected by broken terrain directly in front of them, as well as short projecting roomblock sections that afforded the potential for lethal, defensive crossfire at both locations. In addition, physically blocking ingress/egress was considerably easier when openings in the exterior pueblo walls were small and narrow, as at Kuaua and Santiago. Expedition documents refer to palisades and other obstructions used during the Tiguex War (Day 1940:100-101; Flint and Flint 2005:403) that may suggest wood and perhaps stone, soil, and other debris, were used to block these entrances-exits.

Wall/Roomblock Projections and Recesses: Archaeological research at Kuaua and Santiago pueblos demonstrates that major "inflection points" (such as projecting or recessed wall segments along the exterior façade at both sites) display high concentrations of battle-related material, both Indigenous weapons and Spanish military debris, as discussed above. Wall recesses such as on the south side of the East Plaza at Kuaua end in cul-de-sacs surrounded by solid walls. This recess appears to mimic a similar form on the north side of the roomblock, where the primary entrance-exit to the pueblo is located. The southern recess might have been designed as a false entrance to confuse and entrap attackers, and confront them with multidirectional crossfire (Figure 1, inset, location A). Other recesses at Kuaua, such as the opening at the eastern extreme of the northern roomblock (East Plaza, Figure 1 inset), also created opportunities for *enfilade* fire. In addition, projecting portions of walls-roomblocks, such as a recently identified extension of the northern roomblock at Kuaua, and similar projections on the south and east walls at Santiago, created major opportunities for Pueblo defenders to employ enfilade fire.

Borrow Pits as Enhanced Defensive Features: The large depressions on the north and west side of Kuaua Pueblo, the sources of building material for much of its construction, would also have been a useful element in the pueblo's defense. Some of these, even today, approach 2 m in depth and, from a short distance, are not especially apparent. If approached at speed, either by cavalry or infantry, these features may have caused a tripping hazard or more serious delays or injuries in reaching the outer wall quickly, especially if Spanish troops or their allies were carrying large, cumbersome scaling ladders.

Placement of a Pueblo and Some of Its Salient Features on the Highest Ground in the Area: Kuaua and Santiago Pueblos were both constructed so that they are situated on the highest topographic contours in their immediate area. These positions are extenuated by the presence of borrow pits along portions of its perimeter. Furthermore, areas such as the northeastern entrance/exit way at Kuaua (Figure 1, inset) and the southwest and northeast entrances/exits at Santiago (Mathers and Marshall 2020:39, Figure 2.2) appear to be placed at points that exaggerate the vertical distance between elevated points of ingress/egress and the lower surrounding terrain. These placements favored settlement defense, while disadvantaging attackers.

By examining more closely the defensive characteristics and geographic settings of pueblo architecture, we are gaining greater insight into Late Prehistoric and Early Historic warfare in the Southwest. Furthermore, we are beginning to understand how the form and placement of specific defensive construction features in the landscape relate to more portable, material residues of combat.

Weapons

The archaeological signatures of battle in the form of portable materials and equipment are particularly telling indications of the types of combat that took place, where they occurred, and with what levels of intensity. The systematic surveys at Kuaua and Santiago pueblos allow us to investigate these patterns in a comparative fashion and in some detail. Although the observations and data presented below are provisional since analysis and/or fieldwork are ongoing at both sites, the results are telling an important story that other sources have not.

First, it appears that the types of combat at Kuaua and Santiago followed a pattern similar to those described in historical accounts of the

Vázquez de Coronado expedition's battles at Hawikku, Arenal, and Moho. These accounts describe the use of both cavalry and infantry, the employment of missile weapons via crossbowmen, arquebusiers, and archers, and tactics of encircling Indigenous settlements, attacking them from all sides, and focusing especially on exits and entrances. "Attack vectors" representing relatively narrow lines of broken military debris—Southern Tiwa, Spanish, and Mexican—are discernable at both sites. And within each vector, evidence for similar types of weapons appear in roughly comparable percentages.

Archaeological signatures consisting of large, systematically collected assemblages of military materials from Kuaua and Santiago also put to rest arguments about whether these sites represent any substantive residential occupation by the Vázquez de Coronado expedition. Figures 4, 5 and 6 demonstrate that the vast majority of sixteenth-century European artifacts from both sites are small, broken military items. In addition, these survey data indicate that sixteenth-century objects at both sites occur in fairly similar artifact categories and proportions, and occur overwhelmingly in battle-related extramural contexts, rather than in domestic structures in each pueblo's interior (Figures 7, 8 and 9). Importantly, the presence of a small number of artifacts suggesting domestic activities rather than combat—such as awls, needles, and pins—are found exclusively outside of the pueblo at both Kuaua and Santiago. Also, the 1599 military manual written by Captain Vargas Machuca (2008:73) suggested: "… the soldier knows how to make his own munitions and goes well prepared with them; …they will carry their awls and needles to make sandals…." Similarly, he (2008:73) recommended bags or packs for storing a soldier's equipment: "for they cannot make use of pockets because of the tunics." The use of such packs and bags, particularly in cold-season Tiguex battles such as Arenal, Moho, and the Pueblo de la Cruz when heavy clothing would have been worn, would ensure that metal buckles, hooks, and other fasteners were exposed to high-velocity projectiles like sling stones. These facts may explain the large number of fragmented buckles and fasteners found in close proximity to exterior walls at Kuaua and Santiago.

Fragmentation and small size/weight are clearly dominant characteristics of the overall sixteenth-century European assemblage from Kuaua and Santiago, particularly the latter. These attributes signal not only the quality of the archaeological data recovery involved in both the KES and SES projects, but also the ferocity of the combat that took place at these sites. Again, the overwhelmingly military nature of these objects as well as their highly broken and distorted condition contrasts significantly with the large, excavated assemblage of Vázquez de Coronado materials from Hawikku, a site known to be associated with both battle and long-term residential activity. In comparison with Kuaua and Santiago, Hawikku produced much more material within the pueblo's interior, markedly greater numbers of domestic-related items such as needles, awls, pins, and thimbles, and far more large and complete objects (Smith et al. 1966).

Indigenous Weapons and Battle Signatures.

One of the most important results of the Kuaua and Santiago surveys has been the discovery of large numbers of Indigenous weapons. These objects include sling stones, projectile points (one a Mexica-style chert point), small hatchets, and Southern Tiwa-styled notched axes (Figure 10). At both sites, these objects cluster in areas where there are high densities of broken and fragmented sixteenth-century European metal objects (Figures 3, 11, and 12; Mathers and Marshall 2020:39, Figure 2.2). When comparisons are made of the densities of Indigenous weapons and sixteenth-century European metal objects found to date at Kuaua, it is clear that both sets of material are concentrated in the zone between 0 and 30 m (98 ft) from the exterior wall, and are closely associated with the narrow

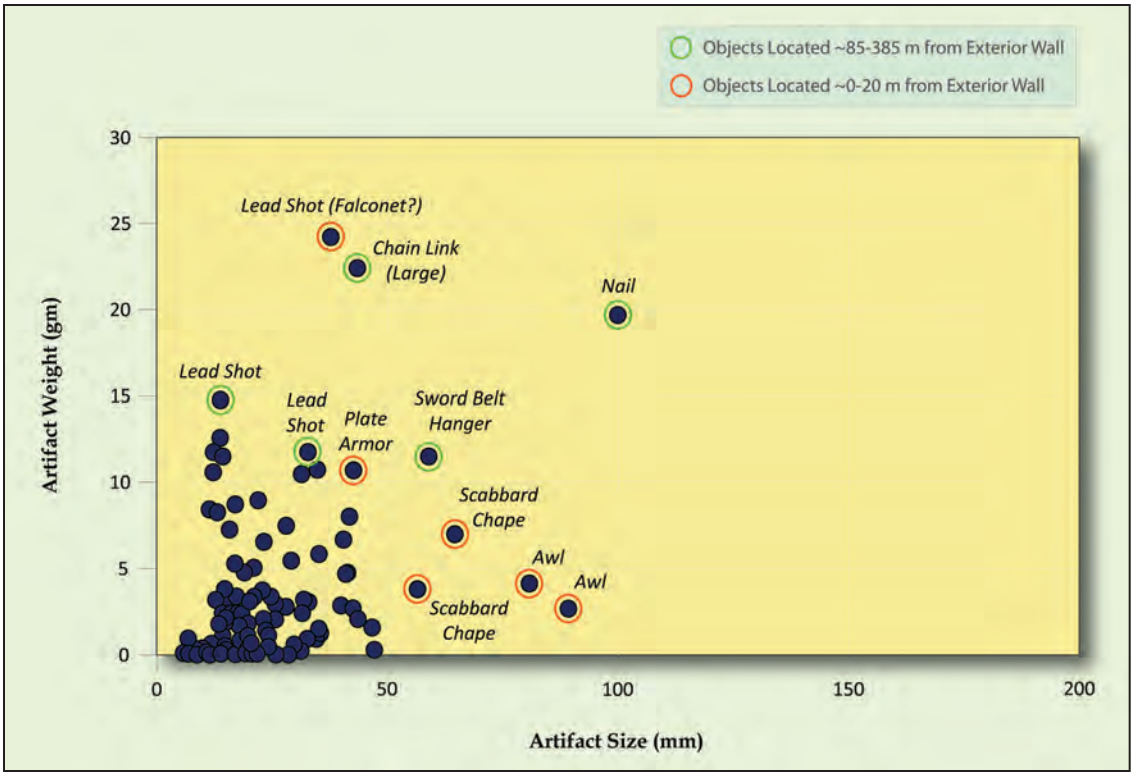

Figure 4. Size and density scattergram of all sixteenth-century metal objects identified to date at Kuaua Pueblo (n=178).

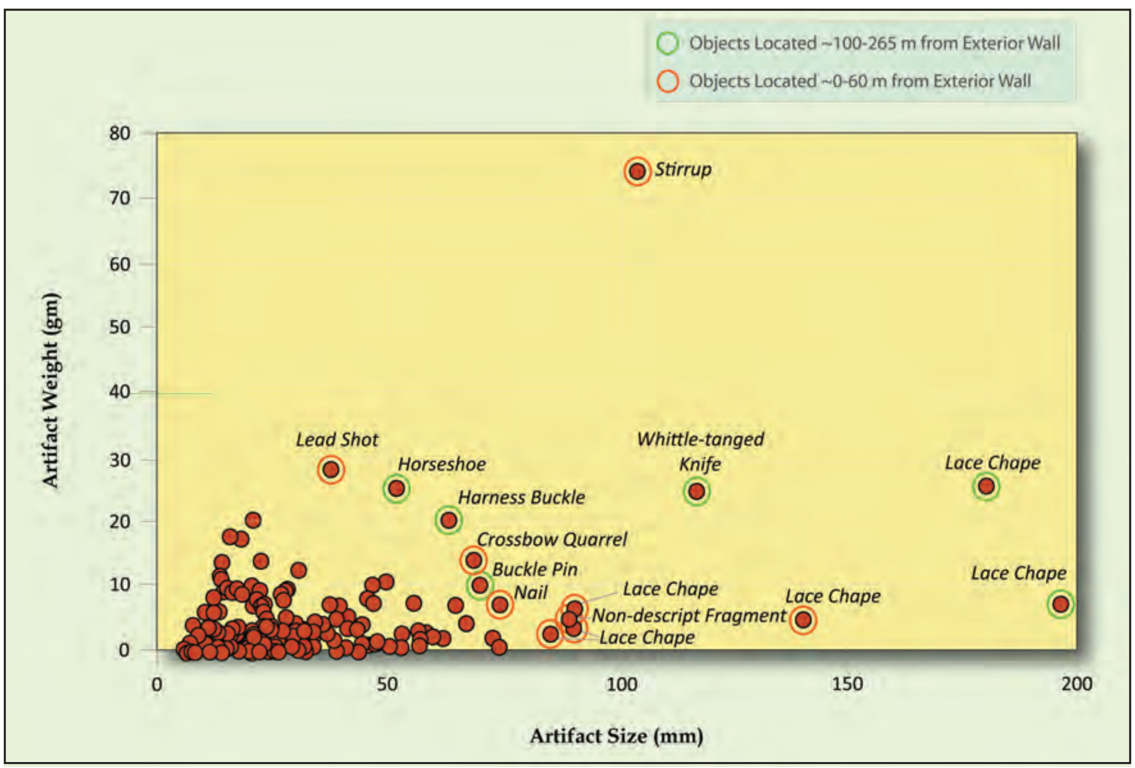

Figure 5. Size and density scattergram of all sixteenth-century metal objects identified to date at Santiago Pueblo (n=637).

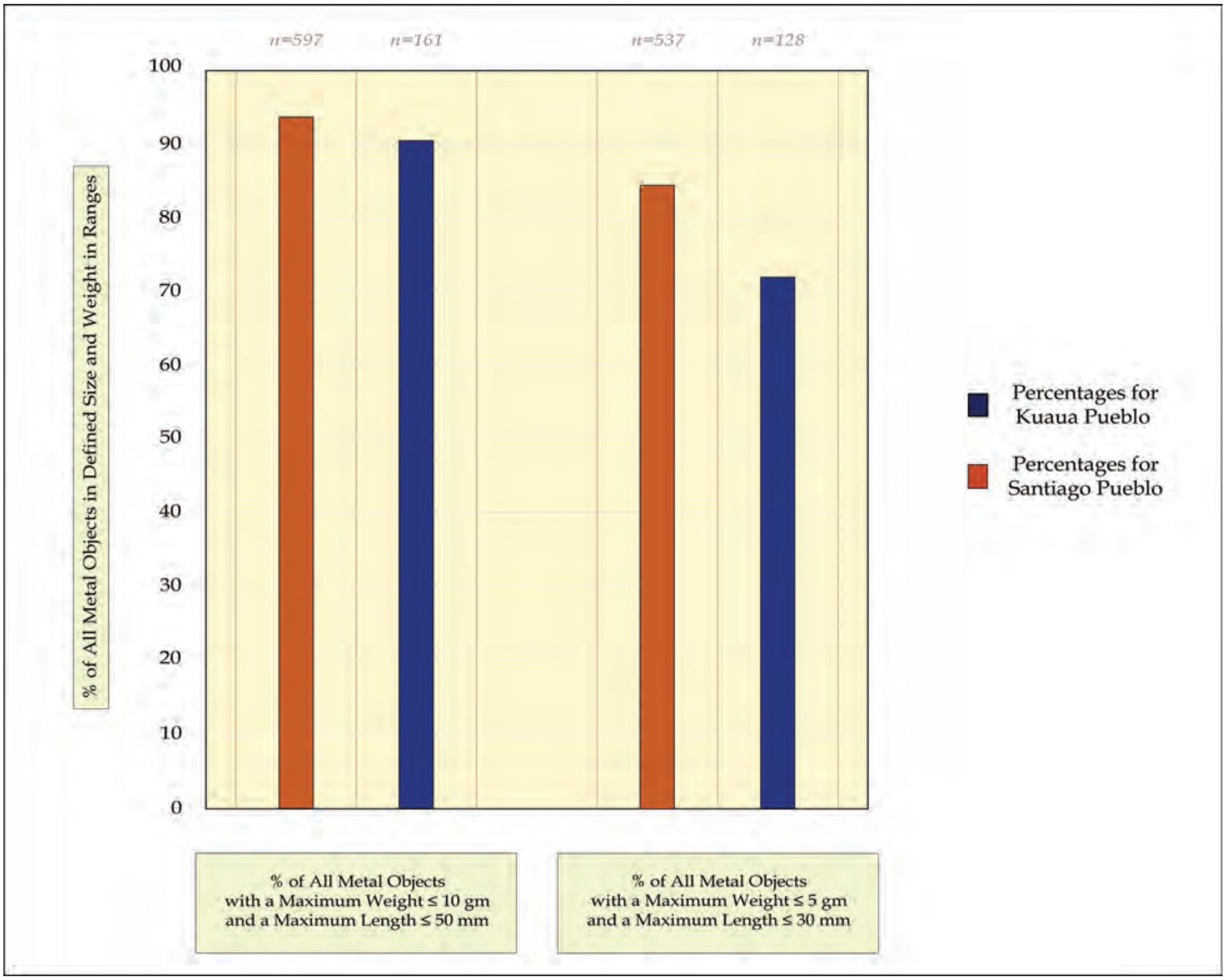

Figure 6. Comparison of size and density data for all sixteenth-century metal objects identified to date at Kuaua and Santiago Pueblos (n=815).

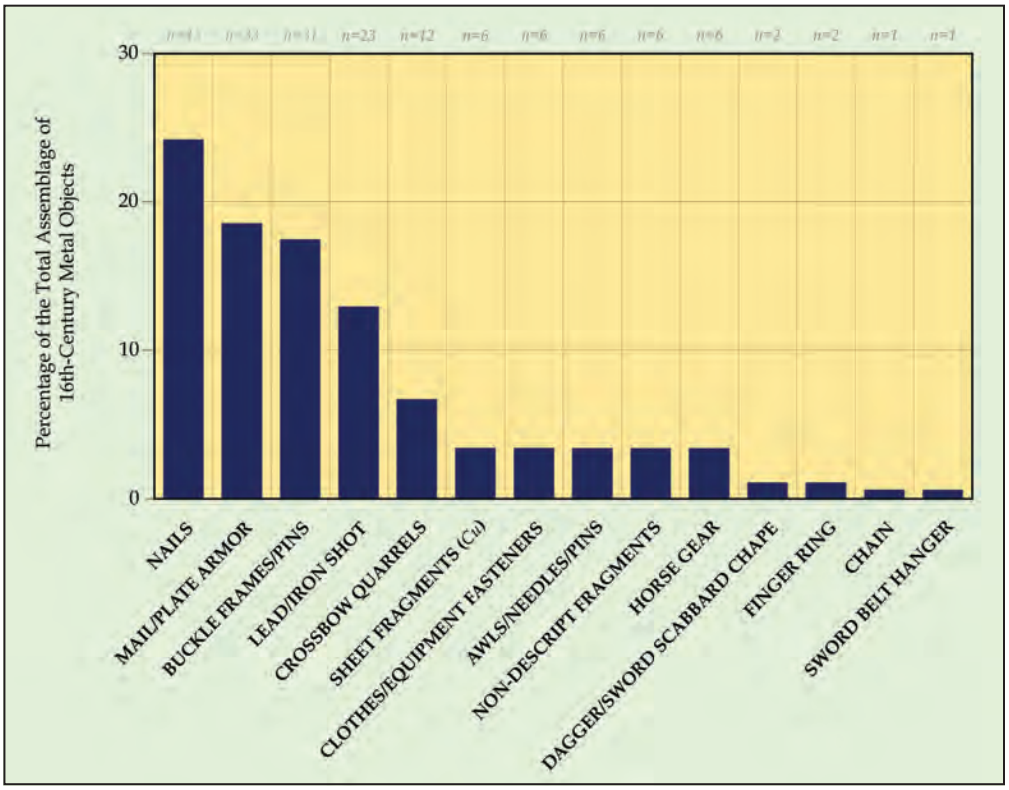

Figure 7. Percentage of the total assemblage of sixteenth-century metal artifacts identified to date from exterior and interior areas of Kuaua Pueblo (n=178) grouped by major functional classes.

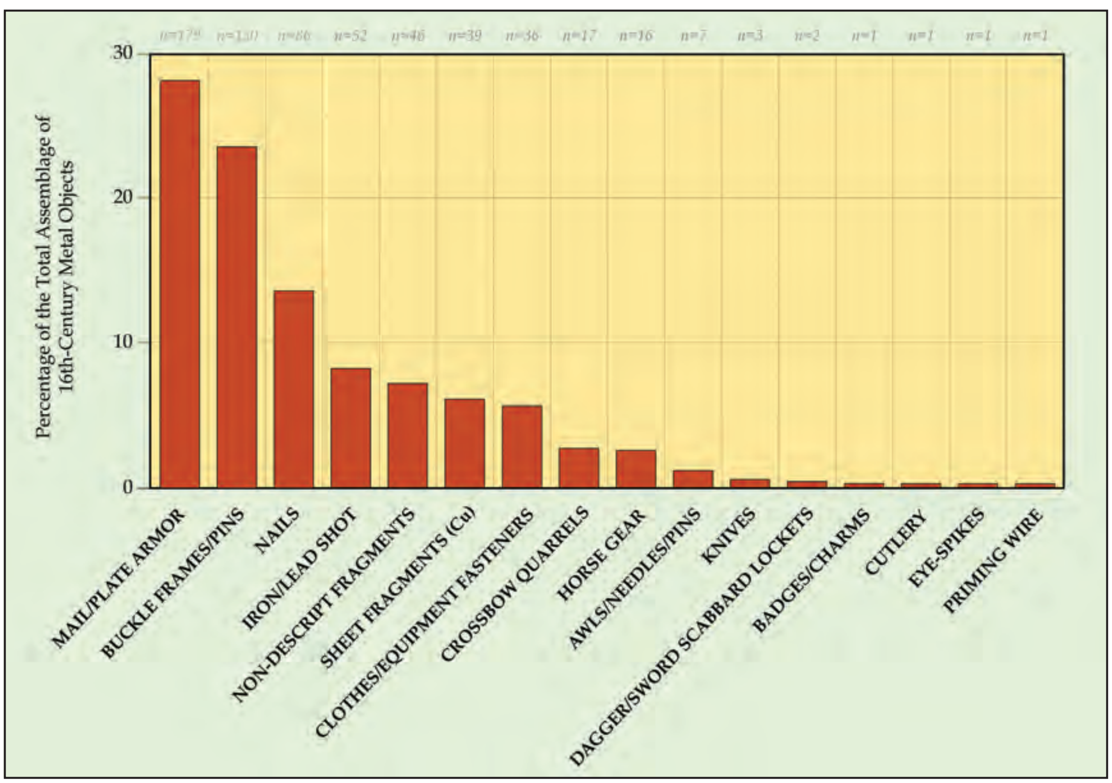

Figure 8. Percentage of the total assemblage of sixteenth-century metal artifacts identified from extant exterior areas of Santiago Pueblo (n=637) grouped by major functional classes.

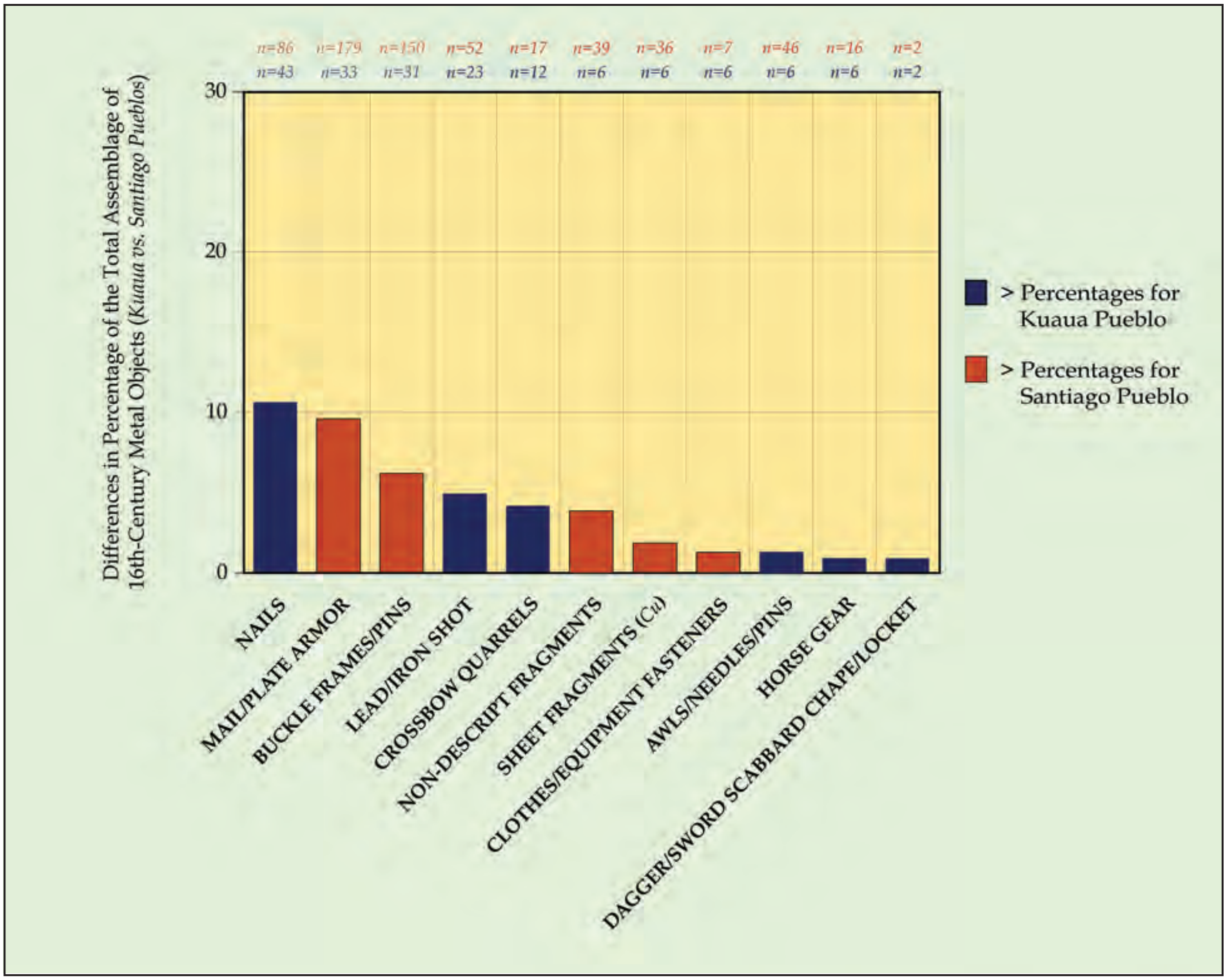

Figure 9. Comparison of the percentage differences in the total assemblages of sixteenth-century metal artifacts identified to date from exterior and interior areas of Kuaua (n=178) and extant exterior areas of Santiago (n=630) Pueblos grouped by major functional classes. These totals exclude single artifacts/artifact classes found exclusively at one site, including seven objects from Santiago (three knives; one badge-charm; one eating utensil; one eye-spike; one priming wire), and four objects from Kuaua (two finger rings; one large chain link; one sword belt hanger).

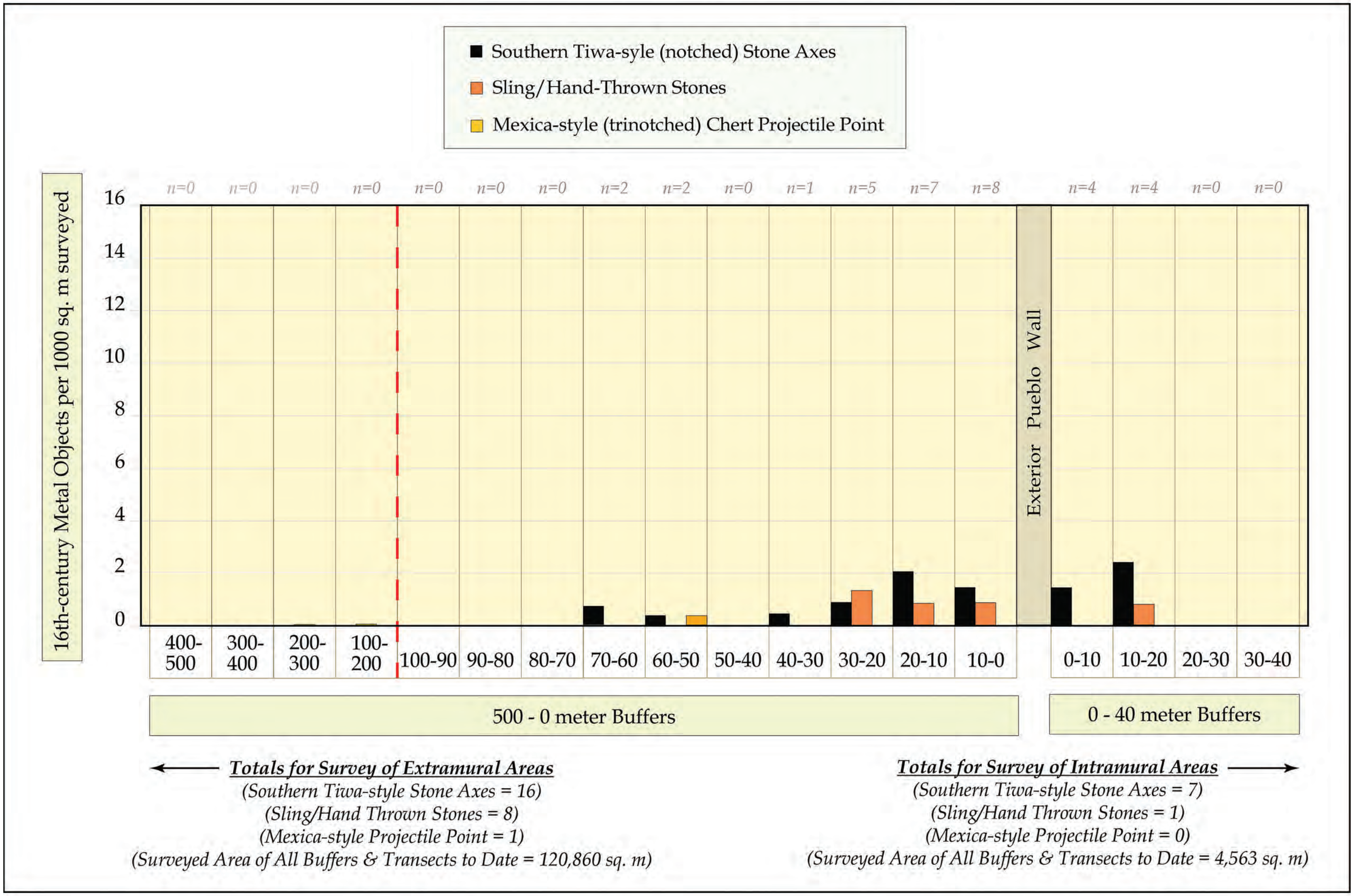

Figure 10. Normalized total of all sixteenth-century Native weapons recovered to date from survey areas (0-500 m) outside of the exterior wall at Kuaua Pueblo (n=25), and all interior areas of the Pueblo (0-40 m) inside the exterior wall (n=8).

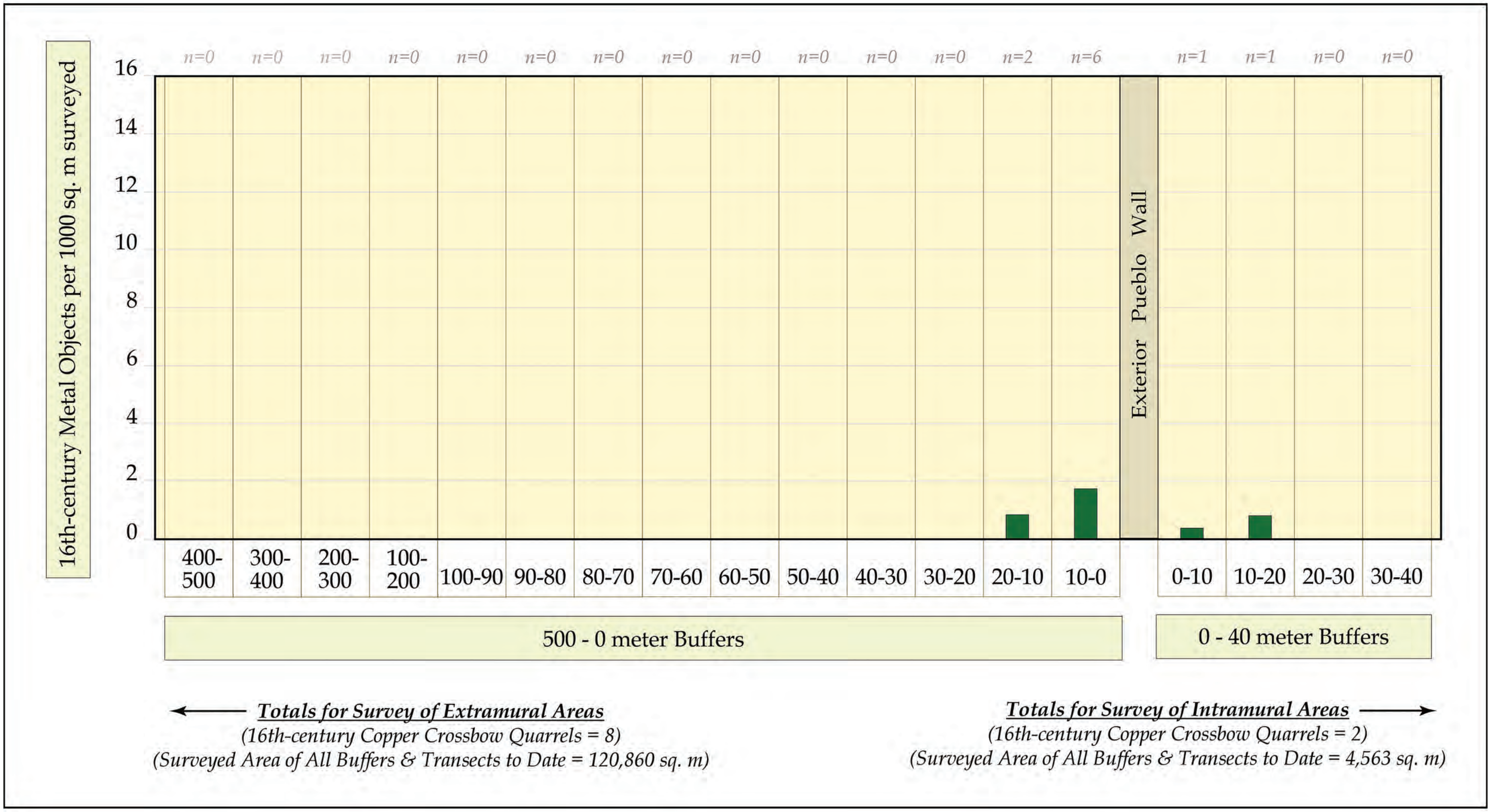

Figure 11. Normalized total of all copper crossbow quarrels recovered to date from survey areas (0-500 m) outside of the exterior wall at Kuaua Pueblo (n=8) and all interior areas of the pueblo (0-40 m) inside the exterior wall (n=2).

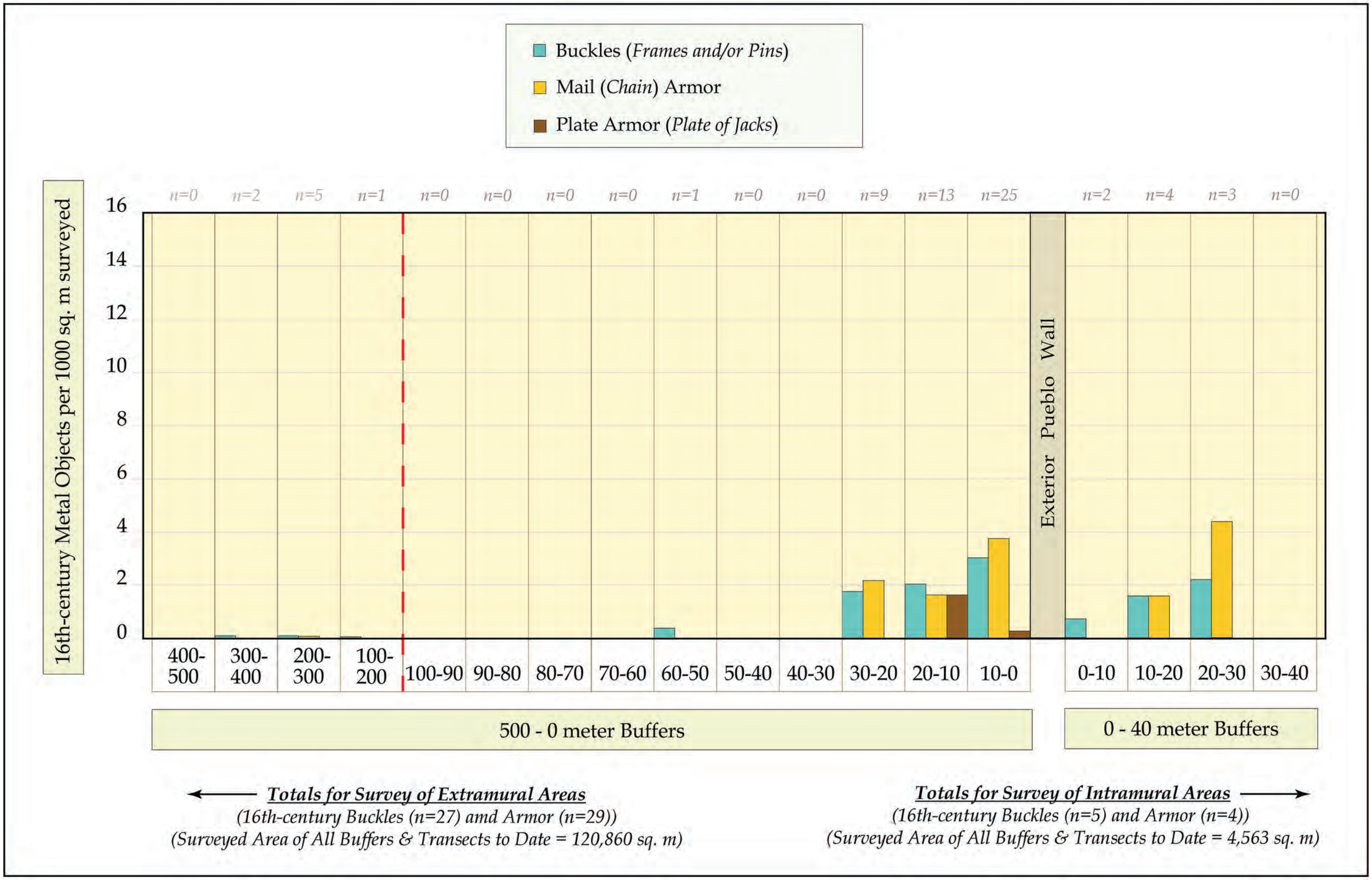

Figure 12. Normalized total of all sixteenth-century buckles and armor recovered to date from surveyed areas at Kuaua Pueblo, from 0-500 m outside of the exterior pueblo wall (n=54) and 0-40 m inside the exterior pueblo wall (n=8).

"attack vectors" or corridors followed by expedition forces assaulting this site. Also significant is the finding that Southern Tiwa, European, and Mexican military objects from Kuaua point clearly to the use of long-range missiles (represented by incoming spent projectiles launched by crossbow, arquebus and bows as well as outgoing [and incoming?] sling stones). In addition, we see evidence of close-quarter combat—witnessed by fragmented mail and plate armor, buckle frames and pins, nails (perhaps from scaling ladders), scabbard chapes, and broken Southern-Tiwa-style axes (Mathers 2020).

Weapons Efficacy

Evidence gathered at Kuaua and at Santiago suggests that many of the most effective military weapons of the Spaniards and their Mexican auxiliaries were either not employed or not used with any frequency during the conflicts there. Spanish weapons including cavalry, light artillery, and archery, together with Mexican armaments such as *macanas*, *macahuitls*, and spears— which were used with great success in many sixteenth-century battles elsewhere in the Americas—appear to have been used infrequently in Tiguex. As in Peru, initial military encounters with Spaniards and their Indigenous allies in open field combat may have convinced Tiguex communities to opt for a defensive siege posture. The sling stones and arrows employed by Pueblo communities in Tiguex, on the other hand, were used in larger numbers and with considerable effect.

Indigenous Ammunition: One seldom-considered issue with respect to the sieges in the Tiguex War and the protracted conflict at Moho (ca. two months) is how Southern Tiwa communities continued to repel Spanish and Mexican forces for such an extended period. Part of the answer, in addition to the architectural and other defenses discussed earlier, is the location of Santiago Pueblo on a substantial gravel deposit. Some decades following the nearly complete excavation of the site in 1934-35, the area became a major gravel quarry. During the siege of this site, ample supplies of stones suitable for ammunition would have been available both around and inside the pueblo via surface and near surface deposits.

Conclusion

In recent decades, field-based studies of fortifications, warfare, battlefields, and weapons have begun to create uniquely and explicitly archaeological frameworks for evaluating conflict (Carman 1997; Foard and Curry 2013; Fox 1997; Keeley 1996; LeBlanc 1999; Liebmann 2010; Sivilich 2016). While these perspectives make use of a myriad of sources, their primary focus is on the material record and an archaeological/anthropological assessment of its significance. As the langrage and landscapes of archaeological studies of warfare expand, we are beginning to see new ways of approaching and understanding the history and prehistory of conflict.

At Kuaua, our perceptions of warfare, walls, and weapons are changing as the material elements of this site have begun to reveal new insights into Indigenous-European warfare. One of the most important contributions to date has been the generation of archaeological signatures of conflict (e.g., Mathers and Marshall 2020; Seymour 2015). Now that we are beginning to identify battlefields, fortifications, and weapons relating to specific Early Historic expeditions, the documentary and ethnohistorical records are enhanced with new perspectives and evidence. Of particular significance in New Mexico are recent successes in identifying specific major battles described in contemporary sixteenth-century historical documents and trial testimonies, the latter relating to post-*entrada* prosecutions of expedition leaders (e.g., Mathers 2020; Mathers and Marshall 2020).

Evidence emerging from the Kuaua Environs Survey points to a number of characteristic, material-based features of conflict that can be used to predict aspects of warfare, architecture, and military equipment. Importantly, these predictions have value in both Prehistoric and Early Historic period contexts, and have implications that are qualitative, quantitative, and spatially specific. By combining some of the data discussed earlier, examples of some of these predictive battle signatures are offered here.

Spatial Distribution

Material residues of siege-related combat should, almost by definition, be concentrated in areas immediately around the exterior façades of settlements and fortifications under attack. Objects found in the interior spaces of such defenses should constitute a much smaller number of military items and represent long-range missiles or personal objects relating to limited close-quarter combat. Archaeological data from Kuaua presented in Figures 9, 13 and 14 suggest the overall distributions of both sixteenth-century metal objects and Indigenous weapons conform with these expectations. Importantly, too, these patterns diverge markedly from a signature of residential activity that we would expect to be manifested by: (a) artifacts concentrated overwhelmingly within the interior spaces of a settlement or fortification; and (b) greater numbers of domestic objects than military items.

Objects found at a considerable distance from the exterior wall of Kuaua Pueblo (see Figures 13 and 14 for items found beyond 100 m from the wall) are also important, as they appear to represent either staging areas at some safe distance away from active combat and/or siege camps intended to encircle the pueblo and frustrate any attempts to lift the siege. A number of items included in these concentrations are larger and more complete objects than those typically found in the primary combat zone (i.e., within about 30 m [98 ft] of Kuaua's exterior façade) and also represent unusual artifact classes (such as a large chain link, a sword belt hanger, an intact roller buckle, and a complete strap end).

Archaeological evidence from the KES survey also clearly indicates that the pueblo was attacked by the Vázquez de Coronado expedition from each cardinal direction, in all probability simultaneously (in a synchronized fashion), mirroring archaeological data and historical descriptions of Early Colonial conflicts and multidirectional attacks in Tiguex (Mathers and Marshall 2020), Zuni (Damp 2005:126, Figure 9.3; Flint and Flint 2005:257, 403), the North American Southeast (Clayton et al. 1993a:235, 293; 1993b:101), Hispaniola (Bergreen 2011:200-201), and South America (Vargas Machuca 2008:115). As in other contexts, such as the Soto expedition in the North American Southeast (Clayton et al. 1993b:339, 380) and at Santiago Pueblo (Mathers and Marshall 2020:39, Figure 2.2), the primary focus of attacks at Kuaua appears to have been major points of ingress and egress.

Duration and Intensity

When compared with the larger absolute number of military objects and the relatively more intense fragmentation of items from Santiago Pueblo (Figures 3, 4, and 5), the conflict at Kuaua appears to have been on a different order than at Santiago. The latter site also produced a number of Indigenous stone axes comparable to Kuaua and a larger number of sling stones and projectile points, despite the substantially smaller area of extant battle area surviving there and surveyed archaeologically. These empirically derived archaeological battle signatures can, therefore, provide valuable insights into the scale and intensity of Indigenous-European conflicts.

Range of Activity and Force Composition

Survey evidence from Kuaua points to significant conflict at the pueblo as well as several possible staging and/or encampment areas situated 100-200 m from its exterior walls. Objects found in this investigation thus far indicate the presence of both cavalry and infantry units, the regular use

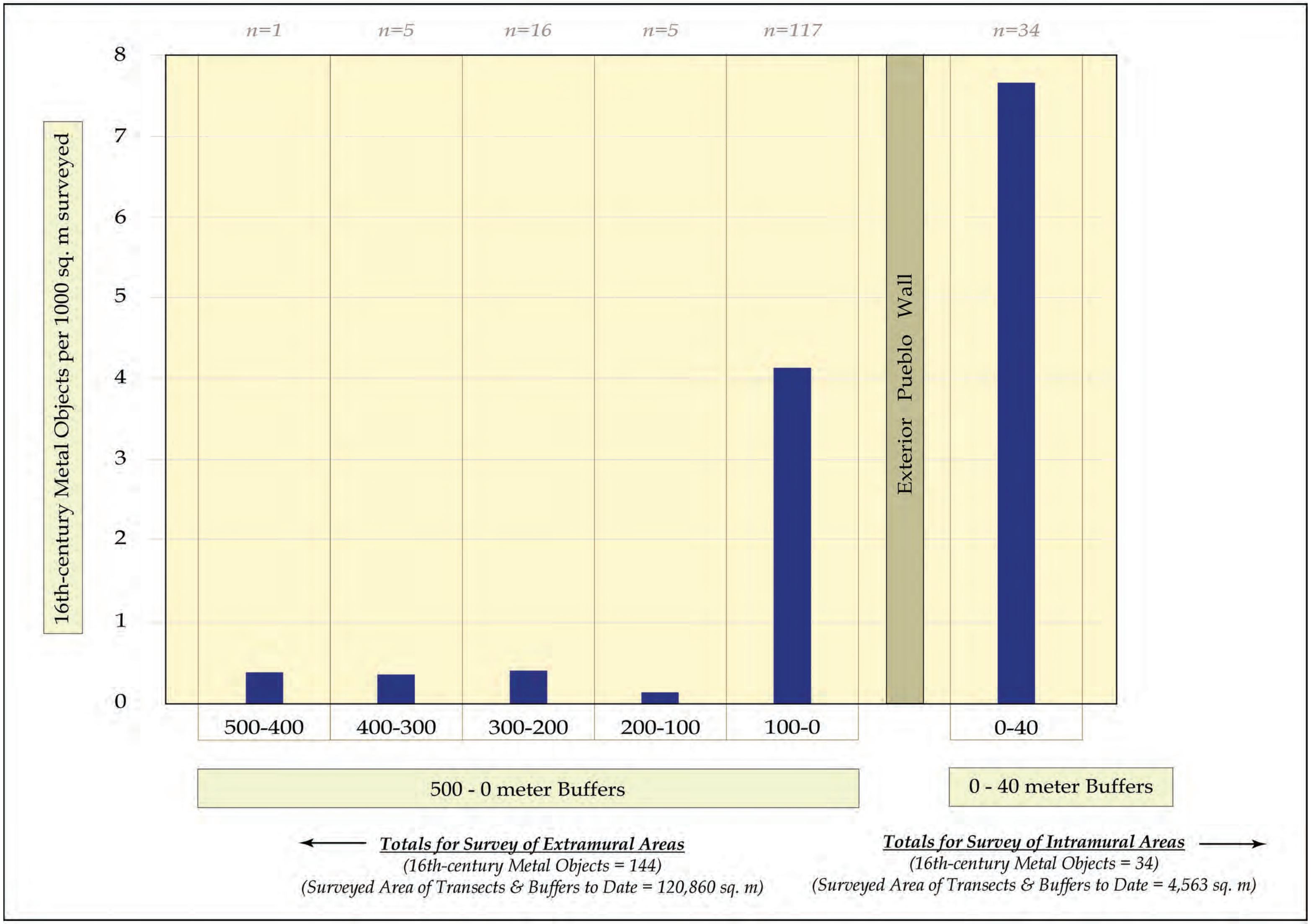

Figure 13. Normalized total of all sixteenth-century metal objects recovered to date from 100 m buffer zones (0-500 m) outside of the exterior wall at Kuaua Pueblo (n=144) and all interior areas of the pueblo (0-40 m) inside the exterior wall (n=34).

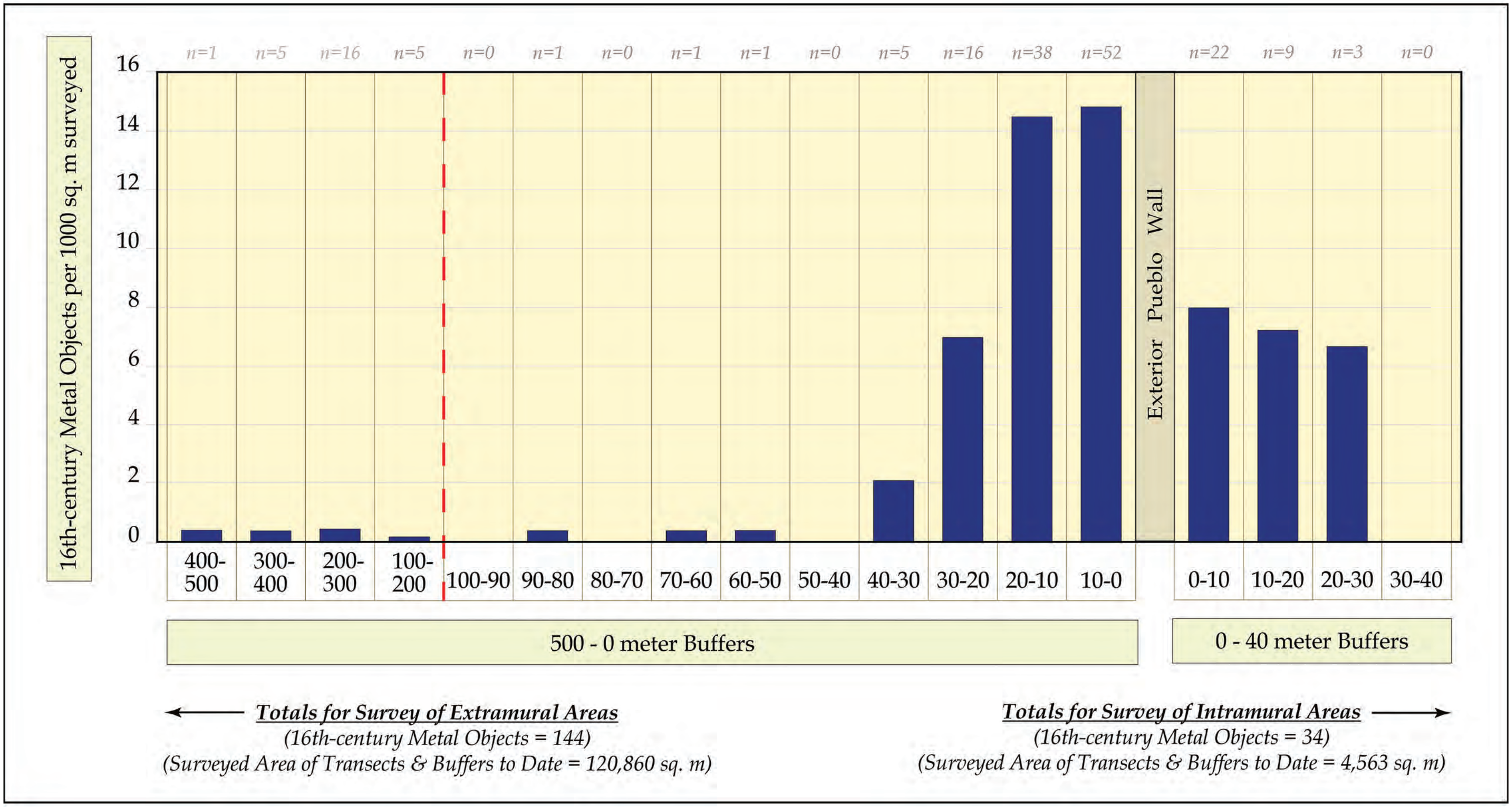

Figure 14. Normalized total of all sixteenth-century metal objects recovered to date from survey areas (0-500 m) outside of the exterior wall at Kuaua Pueblo (n=144), and all interior areas of the pueblo (0-40 m) inside the exterior wall (n=34).

of projectile weapons such as arquebus, crossbows, and sling stones as long-range missiles, and the employment of axes and mail/plate armor in close-quarter combat. Although expedition documents suggest a substantive number of cavalry were present at the siege of Pueblo de la Cruz, horse gear is a rather minor component in the archaeological assemblages from both Santiago and Kuaua. The small amount of this material may be due to the nature of activities pursued by Spanish cavalry, such as patrolling camp perimeters and a siege cordon rather than regular or large-scale combat. Also, as in the Soto *entrada*, members of the Vázquez de Coronado expedition cavalry were some of the wealthiest members of the expedition and as such were some of the best-equipped and protected troops. Their mounts may also have allowed them to retreat or extract themselves more quickly from difficult situations than their counterparts in the infantry and artillery.

With these new linkages, we now have the ability to connect detailed documentary descriptions to discrete locations on the ground and to significant bodies of archaeological evidence for early Indigenous-European combat. An understanding of warfare traditions, architecture, and weapons at Kuaua and other Tiguex sites helps us to understand some of the unique features of the Tiguex War and its series of extended conflicts. Paying closer attention to the design of defensive architecture, as well as the advantages and disadvantages of particular weapons and tactics has been especially valuable. These findings have the potential to transform our approaches to Early Historical conflict by allowing us to engage new suites of material evidence and explore the multivocal significance of these assemblages.

In a recent review of Late Prehistoric and Early Historic Pueblo warfare and tactics in the North American Southwest, Hernández (2020) has suggested battles and open-field warfare were more common among Pueblo communities than have often been recognized previously. During the Tiguex War however, these traditional tactics required modification. From the outset of their military confrontations with the Spaniards and their Mexican auxiliaries—at Zuni and Hopi in 1540—Pueblo communities were aware of the adverse consequences of traditional open-field combat with the Vázquez de Coronado expedition. Even if the results of these conflicts were not communicated immediately eastward to pueblos in the Middle and Upper Rio Grande areas, or made apparent by direct contact with the expedition's early reconnaissance parties sent to these areas, initial conflict (e.g., the forcible occupation of Alcanfor in Tiguex) would have underlined the perils of confronting Spanish forces in open combat. The Inca and other Indigenous communities throughout the Americas learned similar lessons and adapted their tactics accordingly. And while Crusader-era "turn-and-flee" tactics (Mathers 2020:179) were employed by forces under Vázquez de Coronado to maneuver their Pueblo opponents, temporarily, out of their defenses, these measures had limited success and did not alter the overwhelmingly defensive posture of Indigenous communities during the Tiguex campaign.

Using the formidable defenses they had invested in for centuries, Southern Tiwa groups *leveled the battlefield* with the Spaniards and their auxiliaries and prompted their attackers to make their own series of tactical modifications. Writing approximately 25 years after the Vázquez de Coronado *entrada's* return to Mexico, Pedro de Castañeda de Nájera lamented many of the choices made by the expedition in pursuing their sieges in Tiguex:

> In new lands horses are the most necessary thing and what most puts fear in one's adversaries and those who are masters of the countryside. Also, artillery is feared where its use is unknown. With regard to settlements such as those Francisco Vázquez found, some pieces of heavy artillery would have been useful

> to demolish [them], because he took [nothing] except the smallest versillos and no skilled man for building a catapult or other machine which would have frightened the [Indians]. This is very necessary (Flint and Flint 2005:434).

Similar frustrations were expressed by Matías de la Mota Padilla, an eighteenth-century historian who made use of expedition accounts (some now lost). In recounting the expedition's siege of Moho, he states:

> When the Indians had endured some time, and it was thought they were suffering from thirst, it began to snow, with which snow they were saved and maintained themselves two months, during which time our people attempted many foolish acts. One was to build some engines with timbers, which they called swings, like the old rams with which they battered fortresses in times before gunpowder was known; but they did no good. Then, lacking artillery, they attempted to make some wooden tubes tightly bound on the order of rockets; but they did not serve either…And thus, one night the besieged went forth in flight, leaving our people fooled and with no gain except the poor plunder of the besieged place, and the Indians went out valorously (Day 1940:101-102).

Although the conflicts at Arenal, Moho, and Pueblo de la Cruz ended with the Vázquez de Coronado expedition in control of all three of these pueblos, the benefits they enjoyed from these *successful* outcomes appear to have been limited. The Southern Tiwa and the Vázquez de Coronado expedition had both learned something about asymmetrical warfare in the Tiguex conflict. The former successfully extracted a number of combatants from a series of perilous sieges and survived to fight another day and rebuild their communities when the expedition departed in the spring of 1542. Later sixteenth-century *entradas* entering the Tiguex region again met with violence, such as the expeditions of Francisco Sánchez Chamuscado and Fray Agustín Rodríguez in 1581-82 (Hammond and Rey 1966:14, 21) and Antonio Espejo in 1582-1583 (Hammond and Rey 1929:110, 115-116). Ultimately, the decision to establish a permanent Spanish colony in New Mexico in 1598 involved bypassing the Tiguex area and its legacy of sustained conflict begun by the Vázquez de Coronado expedition nearly fifty years earlier. Despite the substantial impacts of the Tiguex War, the late sixteenth-century megadrought, Franciscan missionization, and the restructuring of socio-economic and political structures following the First and Second Pueblo Revolts, Southern Tiwa communities resisted and persisted, and at the same time protected many aspects of their traditional practices, communities, and autonomy.

Acknowledgments

A special "thank you" is owed to James Conder and the tireless work he has undertaken at Kuaua Pueblo for many years. His invaluable efforts have made it possible to carry out much of the research now underway at this site and it is a pleasure to honor his service and contribution to Southwestern archaeology and historic preservation. Other individuals and organizations have provided consistent and enthusiastic support for the KES research, especially: Matt Barbour, Rick Reycraft, and Patrick Moore (New Mexico Historic Sites); Audree Espada, Annie Campagna, Zach Lance, Emily Rodriguez, and Adrienne Boggs (Coronado Historic Site); the Friends of the Coronado Historic Site; and the Pueblos of Sandia, Isleta, and Santa Ana.

Note

Langrage refers to the use of metal or other forms of shrapnel (e.g., glass, ceramics, and stone shards) usually propelled by small artillery pieces such as swivel guns. In this context, the *langrage of conflict* refers to an understanding of warfare, walls, and weapons based on the empirical study of archaeological materials.

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Now You See It; Now You Don't: Elusive Documentation of Talus Unit No. 1, Chaco Canyon, New Mexico

FRANCES JOAN MATHIEN AND THOMAS C. WINDES

Over 80 years ago Talus Unit No. 1 (Figure 1) was excavated during the University of New Mexico/ School of American Research summer field schools. At the time, methods of excavating, stabilizing, and documenting all aspects of work at the site were evolving. Thus, returning decades later with the intent of preparing a site report that would elucidate the relationship of this intermediate-sized site to the great houses and small house sites in the canyon became a challenge. During analysis of extant data, some discrepancies were found among reports and notes, photographs and drawings, and what is currently visible architecturally. As a result, we emphasize the importance of documenting in as much detail as possible all aspects of excavation, stabilization, and other concurrent ancillary projects, and the retention of all records in one repository.

Examples of Missing or Contradictory Data

In 1933 Paul Walter was placed in charge of the initial excavation at Talus Unit No. 1. This work was continued by Margaret Woods in 1934, 1935, and 1937. Both investigators provided a summary of their seasons' fieldwork that included sketch maps, photographs, and field catalog sheets for what were considered noteworthy artifacts (Walter 1933; Woods 1934, 1935, 1938). A few examples of discrepancies among the various records and what we see now are provided below.

Undocumented Trenches

Walter's (1933) report included a map of four rooms and two kivas enclosed within rectangular rooms (Figure 2). He summarized in some detail the evidence for walls and features, including a moat-like structure on the east and southeast side of Kiva B. No mention was made, however, of trenches placed along the exterior of these architectural features.

Review of field catalog sheets from 1933 indicates artifacts were recovered from east, south and north of the east kiva (Kiva A), the north wall trench, the long trench, and the west trench. Excavation of these spaces is confirmed through photographs. Figure 3 shows the location of a trench between the north side of the east section of the site and the cliff face. This was expanded into what Woods (1934:2) describes as a "plazita" (Figure 4).

Less is known about the east trench as it is only partially visible in a few photographs, e.g., Figure 4. It was filled that summer to the level of the cleared path along the east side of the structure. The west trench was placed along the east wall of Room 8 (Figure 5), a room that was excavated during the following field season by Margaret Woods (1934). Without the photographs and the field catalog sheets, we would have little evidence regarding the extent of these exterior excavations or the artifacts recovered from them.

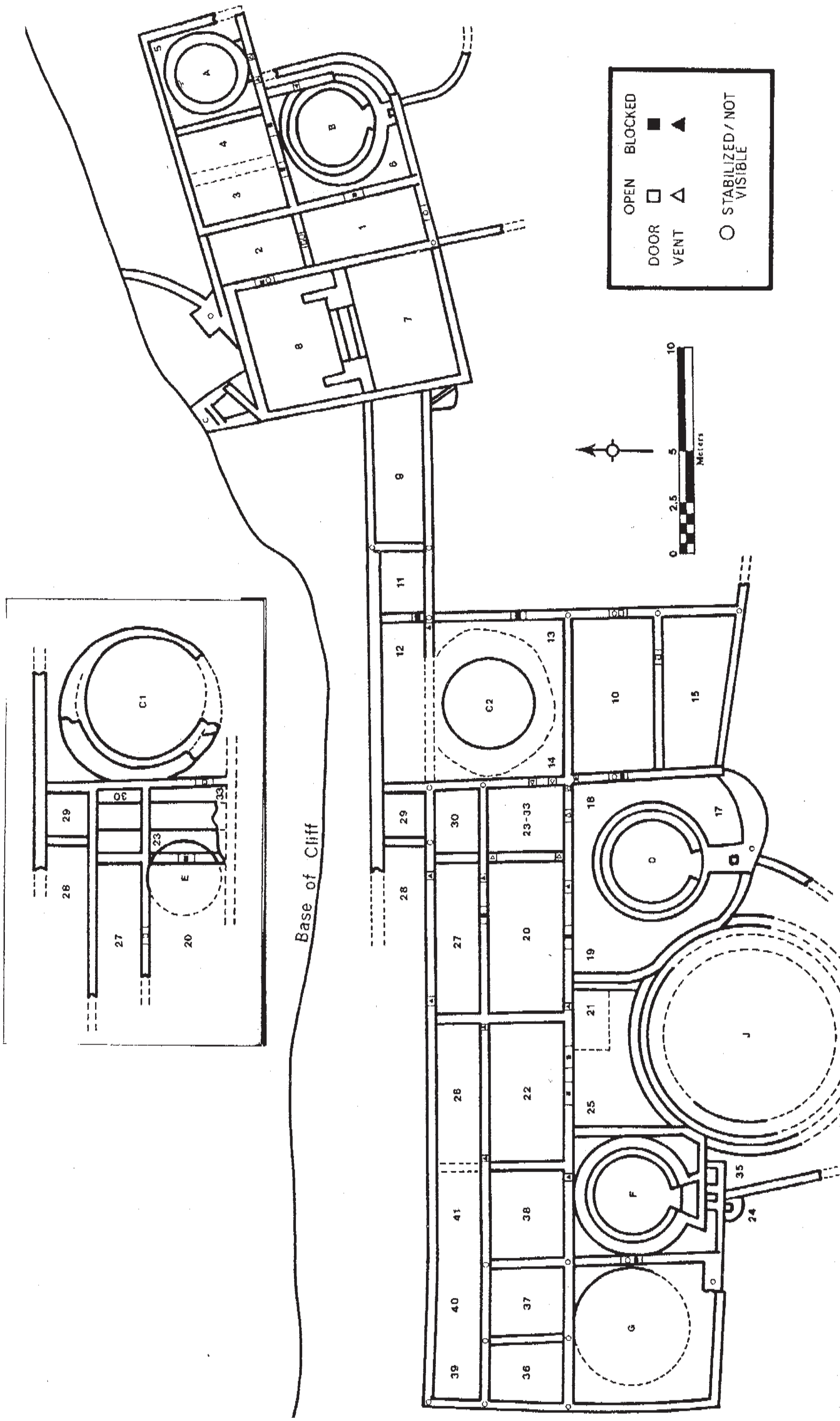

Figure 1. Map of Talus Unit No. 1. (From Lekson 1985:Figure 2.)

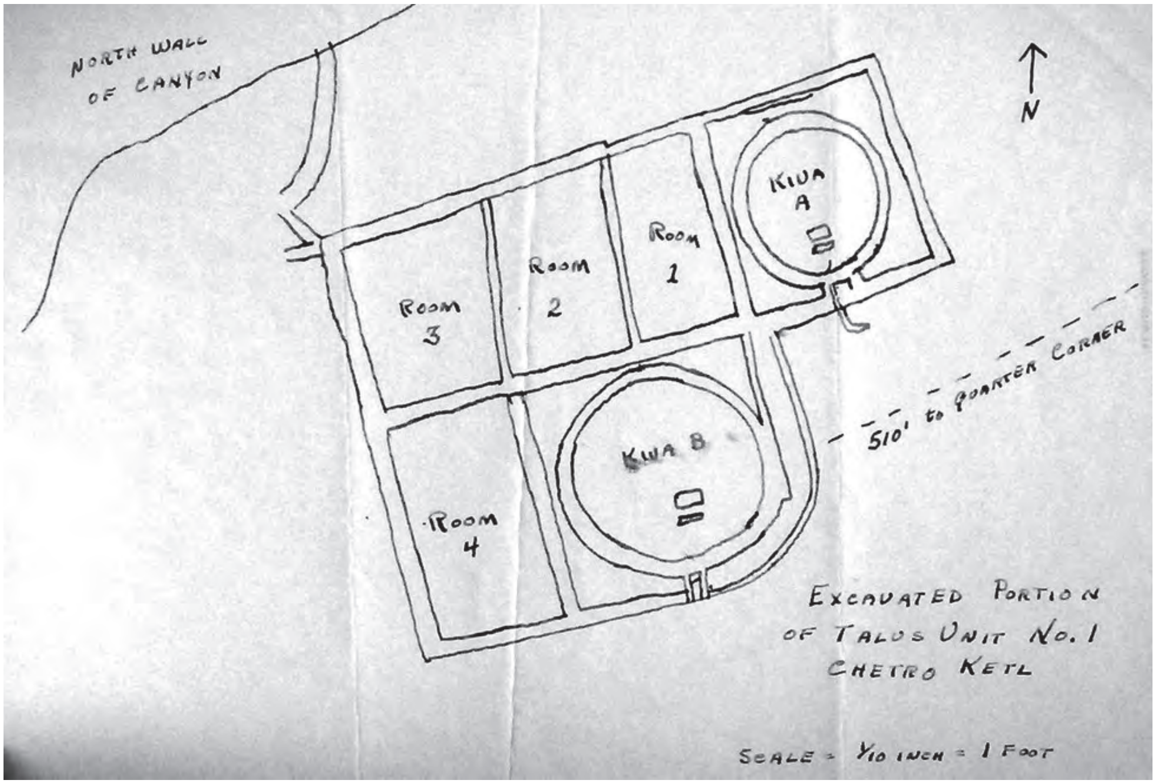

Figure 2. Sketch map of the eastern room block excavated by Paul Walter (1933).

Figure 3. View (looking southwest) of north trench and clearing of area between site and cliff wall. (Courtesy of the Palace of the Governors Photo Archive, Negative No. 81247.)

Figure 4. View (looking southwest) of the area north of the structure after excavation of area that was called a "plazita" by Woods (1934). Also visible is the area east of the kivas where an exterior path is outlined by rocks. (Courtesy of the Palace of the Governors Photo Archive, Negative No. 81238.)

Figure 5. View of completed excavation completed in 1933. The west trench was placed along the interior east wall of Rooms 7 and 8. (Courtesy of the Palace of the Governors Photo Archive, Negative No. 81244.)

North Wall of Room 8

Excavated by Margaret Woods, the north wall of Room 8 was described as consisting of Hawley's Type 2 masonry. Figure 6 illustrates a major opening in this wall just beneath a stone-cut stairway in the cliff wall. Yet in her summary of that summer's work, the only feature in this wall described by Woods (1934:17) was a "small square niche . . . set high in the north wall, into the back of the upper block of masonry described

Figure 6. 81278. Overview of the carved stairway in the cliff face behind Rooms 7 and 8 at Talus Unit No. 1. Located vertically in the center of the photograph, the eroded steps stop several feet above the landing platform behind Room 8. There is a large opening in the back wall of Room 8 (low center of photograph) that aligns with the stairway and would allow passage through the rooms into the open space in front of the site. Also note the stairs that connect Rooms 7 and 8. The south/front wall of Room 7 is very low and almost invisible in this photograph. (Courtesy of the Palace of the Governors Photo Archive, Negative No. 81278.)

in Room #1934-2." She did not comment on the partially filled opening visible in Figure 7 (Woods (1934:Plate IV, Figure 2). Today there is little evidence of this feature (Figure 8).

The presence or absence of a doorway through Room 8, the stairs connecting Room 8 with Room 7, and the doorway from Room 7 that exits into the open space between Talus Unit No. 1 and the west side of Chetro Ketl are important as they affect the interpretation of this site (Figure 1). Ferdon (1955) considered the three steps between Room 8 and Room 7 as evidence of Mesoamerican influence on the Chacoans. If he had been aware of the changes in the back wall of Room 8 and the stairway carved into the cliff above, his interpretation might have been different. Later investigators (e.g., Kelley and Kelley 1975) may not have elaborated as extensively on the influence of southern cultures on the evolution of Chacoan society. Instead we ask, was this section of Talus Unit No. 1 a node in the road system for those entering the canyon from the north between A.D. 1050 and 1100? Room 8 is just below the stairway and landing that link Talus Unit No. 1 (and Chetro Ketl) to Pueblo Alto via a prehistoric road (Mathien and Raab 2011; Windes 1987:105, 135, Figure 5.2). Or was this area part of staging for special events carried out among the inhabitants of the canyon and/or downtown Chaco? Or both?

Latilla Sockets in Room 23/33

In 1992 and 1993 all visible wood at the site was examined and samples were taken for tree-ring analysis by Windes during the Chaco Wood Project (Windes and Ford 1996). His documentation for the exterior east wall of Room 23/33 (Figure 9) indicates that a latilla (No. 7121) in the ceiling of the first story dated at 1070v. In a recent photograph (Figure 10) neither the latilla or its socket remain, and others at the site also appear to have been obliterated during masonry stabilization. Based on the photograph, it does not look as if erosion of the

Figure 7. View of the north wall of Room 8 as published by Woods (1934:Plate IV, Figure 2). Note the major portion of a doorway and damage on the west side of the north wall has been filled in. (Courtesy of the Palace of the Governors Photo Archive, Negative No. 81277.)

Figure 8. A 2010 photograph by Mathien that illustrates that the doorway in north wall of Room 8 has been filled in completely. The cliff-face stairway continues to erode and is barely discernible today.

hole was the major cause for filling up this space. Stabilization records from the 1990s to present do not include a photograph of this wall so we are unable to assign a date for its disappearance.

The presence of the only ceiling latilla sample that provided a date at 1070 is crucial as this supports dates obtained from three vigas in the first story of Room 23/33--the foundation upon which a massive "pier" was built. This pier is one of the most unusual features of the site (Lekson 1985) that we have recently placed in context (Mathien and Windes 2020). The McElmo style masonry of the pier suggests that it was one of the earlier features built in this style in the canyon and supports the beginning date for this type of masonry in the late A.D. 1000s (see Lekson [1984:23-24, 72, 267-269] and Vivian and Mathews [1965:108-110] for a discussion of the appearance of McElmo style architecture).

The Importance of Detailed Documentation and Communication

Working with the available data on Talus Unit No. 1 has reinforced the need for detailed documentation and communication among individuals working in several fields. An excavation project includes not just what is happening with the site excavation crew and supervisor. For example, Ferdon was a 1934 field school student. Yet both he and Woods missed the importance of a doorway in the north wall of

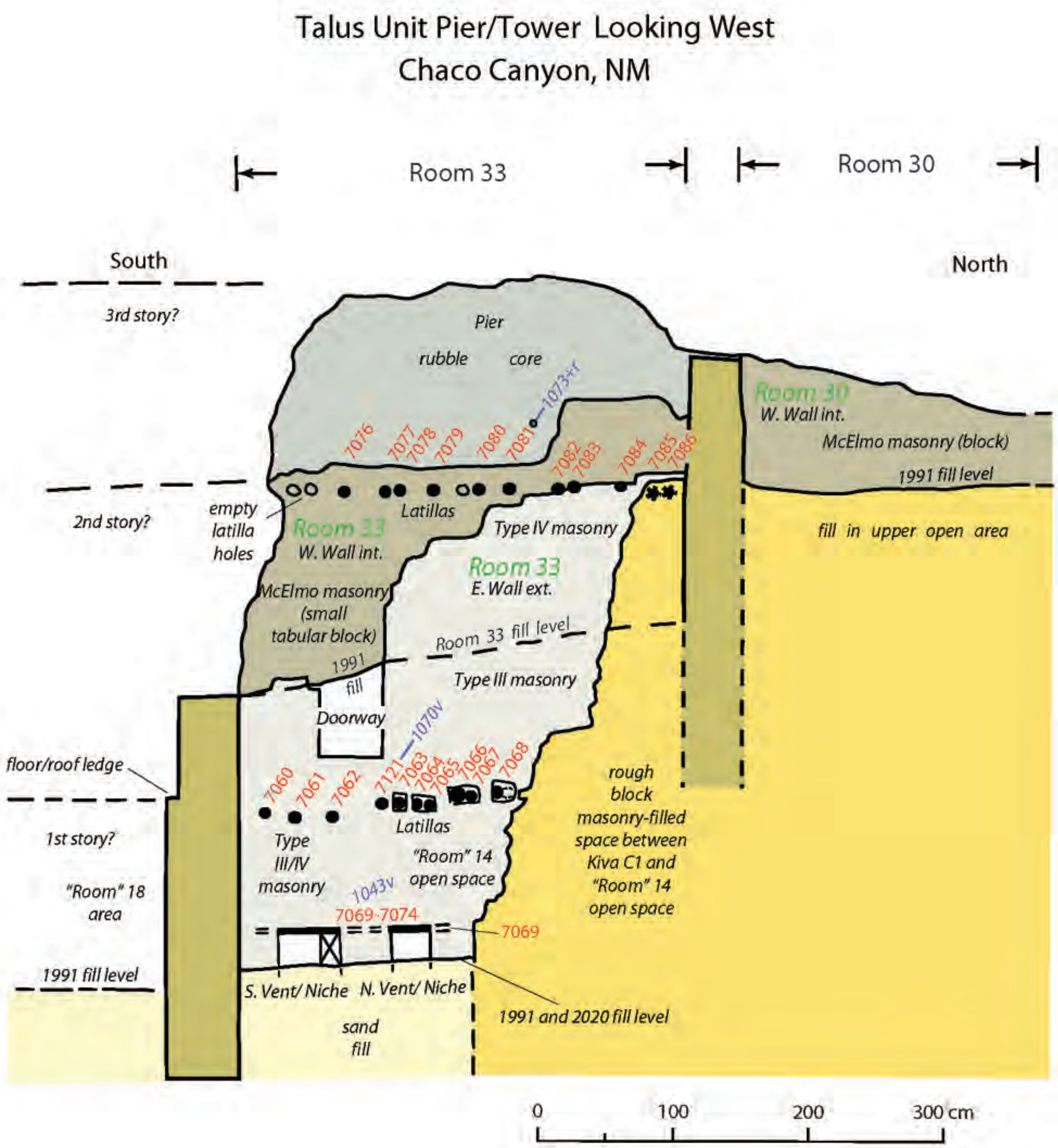

Figure 9. Location of tree-ring samples taken from first and second stories of Room 23/33. Number 7121 in the ceiling of the first floor, and foundation for the pier placed on the second and third stories, is the only ceiling latilla that dated (1070v). Drawing by Windes; digital copy by Clay Mathers.

Figure 10. Photo of exterior east wall of Room 23/33 taken in 2020. Note the latilla hole (No. 7121) visible in Figure 9 has been filled in. Photograph by Richard Voorhees.

Room 8. We conclude that personnel working on other concurrent projects may have altered the evidence before it was properly documented. At Talus Unit No. 1, it became obvious from the photographs of the north wall of Room 8 that some repair or stabilization was being carried out in 1934. In her excavation notes, Woods (1934:1, 4) indicated that she asked for a mason to set a disintegrating doorway in another room; a masonry supporting pillar was set into the doorway. After finding other weakness, she requested “a real repair job” that was denied by Reginald Fisher. This suggests that some repairs were being made; yet Woods (1934) made no other mention of this repair activity at the site.

Evidence from the following summer at Kin Nahasbas (Luhrs 1935) includes a photograph of a Navajo workman pointing the walls of this great kiva (Mathien and Windes 1988). Even though Fisher (1935) acknowledged that experiments with repair and treatment of walls at several sites in Chaco Canyon had been completed by the field schools at that time, there is no formal record of ongoing stabilization (Barrow 2008; Mathien and Raab 2018). Who supervised the work and what methods were used remain uncertain; it would be several more years until Vivian (1949, 1962a, 1962b) prepared a handbook that summarized the procedures that proved useful but his publication did not clarify stabilization at this site in 1934.

Since excavations at Talus Unit No. 1 ended, a number of stabilization projects have been undertaken. The disappearance of any feature highlights the need for an archaeologist to closely supervise stabilization personnel and record any changes made. There is also a need for better communication among professionals—and not only the archaeologists/students and stabilization crew chiefs. Discussions and sharing of information must also include other professionals (e.g., cultural and natural resource personnel working in the area and managing the site).

When working with data from past projects, and especially those that date back many decades, there is a need to review all types of evidence. Summary reports (especially for years when no field notes were retained) do not necessarily contain all the relevant information as to what was excavated during a field season. Comparison of field catalog cards and photographs pointed to the extent of the 1933 excavation outside of the structure itself. We also might have missed the entryway into the canyon from the cliff staircase through Room 8 of Talus Unit No.1 into the area next to Chetro Ketl. Although we can speculate on its exact use, the formality of the entranceway points to a special role in the social organization of the canyon populations.

We would also urge archaeologists and cultural resource managers to maintain all files pertinent to a site in a single repository and curators to link all data available for that site in their database files. We also urge curators to share information that is filed in several repositories so that it is available to researchers in all fields and managers can easily review the data relevant to their project. New project results should then be deposited where the main collection resides and not separated, as is often the case.

In summary, there are challenges in using data from decades-old archaeological projects. Using what data are available, however, is rewarding as it expands our understanding of a site and can contribute to a better understanding of the society it represents.

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A Taste of The Ozarks in New Mexico

MICHAEL TREVOR MCDERMOTT AND DOUGLAS H. M. BOGGESS

Giraffe stone masonry is a unique form of folk construction that was popular in the first half of the twentieth century, commonly seen in the Ozark region of the United States. Homes built with this style of masonry reflect the creative ingenuity of the people that built them while using materials that were immediately available. The knowledge and style of giraffe stone masonry quickly spread along railroads and newly developing cross-national highways (especially Route 66) into New Mexico, where homes of this style are scattered throughout the state (Figure 1).

Figure 1. Giraffe style, Pate house, Hobbs, New Mexico.

The Ozark Mountains region of the United States includes portions of Missouri, Arkansas, Oklahoma, and southeastern Kansas. This area is largely rural with mountainous terrain and shallow rock deposits, making poor soil for farming. The rocky terrain would often seclude people geographically from each other. According to writer and photographer, John Foster, this regional isolation created a culture of resourceful and self-sustaining people that built their homes out of what was immediately available to them (Foster 2013). Historian, Bonnie Stepenoff, stated that Ozark rock masonry represented "traditions of hard work, self-reliance, and attachment to the land that are hallmarks of Ozarks culture" (Stepenoff 1993:16). Giraffe-stone masonry is the perfect example of vernacular construction to reflect such creativity and necessity.

Giraffe stone masonry—also known as giraffe rock, giraffe stone, and giraffe houses—

gets its name from the visual resemblance of the rock construction to the patterning of the spots of the African giraffe. The masonry is characterized by uncoursed patterns with irregularly shaped stone or rock slabs of red, orange, brown, and tan color that is typically rough-cut, uncut, broken, or whole in use, placed in indiscriminate random designs (Figure 2). The mortar placed between the rocks is wide and often painted white, gray, or black, in order to exaggerate the contrast in rock color and visually pop-out at the viewer in a three-dimensional way. The mortar may also be beaded and puffy, extending out up to an inch away from the rock surface and rounded using a spoon or split pipe (Swanson et al. 1989:58) (Figure 3). Limestone, sandstone, dolomite, and granite, which are abundant fieldstone materials in the Ozarks, were the most common rocks although almost any kind of rock could be used. The terms *rock* and *stone* are used interchangeably when regarding this type of masonry, but as Architectural Historian Debbie Sheals points out, *rock* is more accurate for this construction description as *stone* is more often used to describe a more polished or processed rock (Sheals 2006:1).

Most giraffe stone masonry houses were built between 1920 and 1940. These homes were normally not more than 1,000 square feet and only one-story high (Jordan 1990:82). The homes were built according to vernacular or folk plans that were simplistic in design and reflected a minimalist approach that focused on the needs of the family.

Figure 2. Detail of giraffe style, Pate house, Hobbs, New Mexico.

They were meant to provide maximum livable space at minimal cost. Part of the cost-saving was to use as much local material as possible.

The promotion of this construction method in communities through workshops and publications aided in the dissemination of this architectural style. According to Sheals, the University of Missouri Extension Service held workshops for people on masonry construction using local materials in the 1920s and 1930s. Sheals also states that *Missouri Magazine* published an article in 1934 with detailed instructions for the construction of rock structures (Sheals 2006:5). These workshops and articles proved to be popular because people were able to inexpensively construct dwellings using the local rock and limestone/sandstone that was easily harvested from shallow deposits and rock outcrops. By using fieldstone and other easily acquired rock as the exterior façade, people were able to reduce costs by using less milled lumber (Gourd 2019). The easily achievable designs possible with giraffe masonry also added to its popularity in the region. Creating a design involved splitting rock slabs to a thickness of 1½ to 3 inches and then laying them out on the ground in the desired combination of colors and textures before placing mortar on the back of the stone (Flanders 1991:38). The arrangement of rock was then placed as a veneer over wood-stud framing (Becker and Millstein 1992:29) (Figure 4).

A 1992 survey of Ozark rock masonry structures found that most appear to have been built as Craftsman style bungalows, Tudor-style homes, and open gable homesteads (Becker and Millstein 1992:16-27). A 1989 archaeological survey of the

Figure 3. Raised mortar in giraffe style, Mountainair, New Mexico.

Figure 4. Giraffe style, showing veneer construction, house, Mountainair, New Mexico.

region noted the popular vernacular construction style of the pen plus tradition using pattern books (Swanson et al. 1989:38). The pen design involved the construction of a single room (single-pen) dwelling. If the construction consisted of two rooms or more, it was considered double-pen or pen-plus architecture. Pattern books for this home design typically provided simple architectural planning and design instructions for the average person to use and could be obtained by mail-order or from the local general store. The Minimal Traditional style of construction is also often seen among giraffe houses in various areas.

Originally, giraffe stone houses were specific to the Ozark region, but with a developing highway and railroad system, giraffe stone masonry began to appear in other parts of the country. The continuing development of railroad and highway travel through the Ozarks in the 1920s led to an expanding cultural landscape for a previously isolated people (Swanson et al. 1989:12). People in the Ozarks became able to travel longer distances in much shorter periods of time, reaching towns and cities that had previously been prohibitively distant. As people traveled on these highways, their knowledge of construction traveled with them. The new highway system also allowed building materials such as native Ozark rock to be easily moved outside the Ozarks to neighboring areas (Becker and Millstein 1992:9).

Historic Route 66, one of several cross-national highways passing through New Mexico in the early to mid-twentieth century, became key in the expansion of this style to places like New Mexico. Route 66 was commissioned in 1926 by the Department of Agriculture, providing almost 2,500 miles of pavement between Chicago and Los Angeles (Kittel et al. 2002:54, 19). Sections of the Ozark Trails Highway would become part of the new Route 66 and would connect the Ozark region to New Mexico (Sonderman 2010:7). The ease of acquiring materials and simple design process led to this distinctive stonework being adopted in many places along Route 66. Giraffe-stone structures can be seen on Route 66 branching out from the Ozarks as the masonry's popularity spread (Foster 2013).

Giraffe stone construction was readily accepted in New Mexico where similarities with the Ozarks and its people included being a largely rural state with easily accessible sources of fieldstone and other rock. Giraffe houses were built across New Mexico not only adjacent to Route 66 and the railroad, but along the less commonly traveled roads and highways. Wonderful examples of this Ozark style can be seen in New Mexico in towns and cities such as Mountainair, Corona, Roswell, Duran, and Hobbs, to name a few (Figures 5-10).

Figure 5. Giraffe style, house, Mountainair, New Mexico.

Figure 6. Giraffe style, house, Corona, New Mexico.

Figure 7. Giraffe style, house, Roswell, New Mexico.

Figure 8. Giraffe style, house, Roswell, New Mexico.

Figure 9. Giraffe style, house, Duran, New Mexico.

Figure 10. Giraffe style, house, Hobbs, New Mexico.

One example of a Giraffe-stone home in New Mexico is in Hobbs and is owned by Judy Pate. Interviews with Pate began with the connection of her giraffe stone house and that of the Ozark region and other folk traditions involving the builder of her home. Pate spoke of how the original owners of the home had built it in 1934 using at least some rock from their travels out of state in areas such as Texas and Oklahoma. She mentioned that the original owners had often picked rock that they felt were special, such as "fossilized rock," petrified wood, and stone artifacts (Pate, personal communication, February 20, 2016) (Figures 11-13). These special rocks would add to the craftmanship and personal relationship the builders had with the home. This pride in construction was seen often in the Ozarks,

Figure 11. Fossiliferous limestone, giraffe style, Pate house, Hobbs, New Mexico.

Figure 12. Petrified Wood, giraffe style, Pate house, Hobbs, New Mexico.

Figure 13. Metate incorporated into giraffe style, Pate house, Hobbs.

which added to the folk feeling of this vernacular tradition of architecture.

This unique home design came about and grew in popularity due to ease of construction and resource availability, but the country developed along new infrastructure such as highways, people began to have access to cheaper building materials that allowed for quicker construction. As a result, giraffe stone masonry began to die out in the 1950s as labor costs increased (Sheals 2006:9). Due to its popularity in the first half of the century, the 1930s and 1940s are considered the “Golden Age of Ozark Rock Masonry” (Stepenoff 1993:12).

To this day, homes with this distinctive stonework have endured across the Ozarks and along transportation corridors emanating from the region. Its spread along Route 66 into the American Southwest can be witnessed in many New Mexico communities that valued such a folk ethic of simplicity in architecture and ingenuity. Giraffe-stone masonry represented a willingness to make do with what is available in a relatively geographically isolated area and should capture greater notice in treatments of architectural history, especially outside of the Ozarks.

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Ethnogenesis, Acculturation, and Site Formation Processes Through Analysis of Chipped Stone Artifacts from Giusewa

JAMES L. MOORE

The types of questions that are often asked during chipped stone analyses tend to focus on the types of materials used and their sources, how reduction was accomplished, and what activities can be inferred from the tools. However, it is also possible to ask more complex questions. Analysis of a chipped stone assemblage from an historic-period room at Giusewa (LA 679), a Jemez ancestral village in Jemez Springs, New Mexico, was aimed at answering the traditional as well as more complex questions.

Giusewa was established in the late thirteenth or early fourteenth century; its inhabitants moved elsewhere around 1694 A.D. (Barbour and Ortega 2019). The analyzed assemblage came from Room 100, which was probably burned and abandoned during the Jemez Revolt of 1623 or the Pueblo Revolt of 1680 (Barbour and Ortega 2019:13). Besides the traditional questions of materials, technology, and function, this study was designed to address issues of Jemez ethnogenesis and the effects of Spanish colonization on material culture. Other topics that became of interest during the analysis were determining the source(es) of the obsidian used, and what certain types of damage to obsidian artifacts could tell us about the deposits in which they were found.

Five strata were defined in Room 100 (Barbour and Ortega 2019:12), the upper three of which were deposited after the room burned. The uppermost 70 cm of fill (Strata 1 and 2) probably washed into the room through erosion. This fill was a silty sand containing a mixture of nineteenth and twentieth century refuse with prehistoric and early historic artifacts, with the modern materials occurring in the upper 20 cm (Stratum 1) but missing from the lower 50 cm (Stratum 2). Stratum 3 was 50 cm thick and contained the same types of artifacts as Stratum 2, with a charcoal lens separating the two units. Stratum 3 represented a period of stability in formation processes, lasting long enough for a small tree to take root and grow out of this stratum. The two lowest strata (Strata 4 and 5) represented occupational fill as opposed to the post-occupational deposits defined as Strata 1–3. Stratum 4 was 40 cm thick and contained burned roof materials and architectural debris. The lowest 10 cm of fill was separately excavated as Stratum 5 and contained materials that were on or near the floor at the time of abandonment. Stratum 0 was assigned to artifacts with no provenience information available for them.

The Chipped Stone Assemblage

A total of 1,376 chipped stone artifacts was analyzed from Room 100. Analysis was accomplished using a standardized methodology designed at the Office of Archaeological Studies (OAS 1994) and was aimed at defining artifact typology and use as well as material type and origin. Table 1 shows the distribution of material types by stratum. Obsidian

Table 1. Material type by stratum; counts and column percentages.

Material type		Stratum 0	Stratum 1	Stratum 1/2	Stratum 2	Stratum 2/3	Stratum 3	Stratum 3/4	Stratum 4	Stratum 4/5	Stratum 5	Total
Chert	Count	1	7	2	53	3	34	11	17	25	1	154
	Column %	12.5%	18.4%	4.7%	12.8%	11.1%	10.7%	9.5%	7.9%	13.7%	6.7%	11.2%
Pedernal chert	Count	3	7	6	31	1	48	16	23	24	5	164
	Column %	37.5%	18.4%	14.0%	7.5%	3.7%	15.1%	13.8%	10.7%	13.1%	33.3%	11.9%
Silicified wood	Count	–	–	–	1	–	1	1	–	–	–	3
	Column %	–	–	–	0.2%	–	0.3%	0.9%	–	–	–	0.2%
Palm wood	Count	–	–	–	1	–	–	–	–	–	–	1
	Column %	–	–	–	0.2%	–	–	–	–	–	–	0.1%
Jemez obsidian	Count	3	19	27	284	20	208	83	157	124	8	932
	Column %	37.5%	50.0%	62.8%	68.8%	74.1%	65.4%	71.6%	73.0%	67.8%	53.3%	67.8%
El Rechuelos obsidian	Count	–	1	3	4	–	–	–	1	–	–	9
	Column %	–	2.6%	7.0%	1.0%	–	–	–	0.5%	–	–	0.7%
Igneous	Count	–	–	–	–	–	1	–	–	1	–	2
	Column %	–	–	–	–	–	0.3%	–	–	0.6%	–	0.2%
Basalt	Count	–	–	–	–	–	2	3	–	–	–	5
	Column %	–	–	–	–	–	0.6%	2.6%	–	–	–	0.4%
Basalt/Andesite	Count	1	3	3	27	1	16	2	15	5	1	74
	Column %	12.5%	7.9%	7.0%	6.5%	3.7%	5.0%	1.7%	7.0%	2.7%	6.7%	5.4%
Red rhyolite	Count	–	1	–	–	–	–	–	–	2	–	3
	Column %	–	2.6%	–	–	–	–	–	–	1.1%	–	0.2%
Aphanitic rhyolite	Count	–	–	–	1	–	1	–	2	1	–	5
	Column %	–	–	–	0.2%	–	0.3%	–	0.9%	0.6%	–	0.4%
Tuff	Count	–	–	–	–	1	–	–	–	–	–	1
	Column %	–	–	–	–	3.7%	–	–	–	–	–	0.1%
Limestone	Count	–	–	–	5	1	5	–	–	1	–	12
	Column %	–	–	–	1.2%	3.7%	1.6%	–	–	0.6%	–	0.9%
Metaquartzite	Count	–	–	2	4	–	2	–	–	–	–	8
	Column %	–	–	4.7%	1.0%	–	0.6%	–	–	–	–	0.6%
Orthoquartzite	Count	–	–	–	1	–	–	–	–	–	–	1
	Column %	–	–	–	0.2%	–	–	–	–	–	–	0.1%
Quartz	Count	–	–	–	1	–	–	–	–	–	–	1
	Column %	–	–	–	0.2%	–	–	–	–	–	–	0.1%
Total	Count	8	38	43	413	27	318	116	215	183	15	1,376
	Row %	0.6%	2.8%	3.1%	30.0%	2.0%	23.1%	8.4%	15.6%	13.3%	1.1%	100.0%

was the most common material used, and the two varieties that were distinguished together make up over two-thirds of the total chipped stone assemblage. Pedernal chert was the next most common material, representing nearly 12 percent of the assemblage, and was closely followed by generic cherts. Basalt/andesite was the third most common material but made up less than 6 percent of the assemblage. Though numerous other materials were identified, they were comparatively rare, making up less than 1 percent of the assemblage apiece.

Most of these materials were locally available to the residents of LA 679, while the sources of some materials remain obscure. Obsidian outcrops in several locations in the Jemez Mountains, especially in and around the Valles Caldera, and is discussed in detail later. Pedernal chert outcrops in limestone in the Chama Valley and on San Pedro Mountain (Banks 1990), and commonly occurs in gravel deposits along the Rio Chama and the Rio Grande. Since there is no local source for this material, it would have been acquired either during foraging expeditions or through trade with groups having better access. Silicified wood is also common in gravels along the Rio Chama (Banks 1990:67) and may have been procured in the same way as Pedernal chert. Limestone outcrops in the Madera formation in San Diego Canyon and on both sides of the NM 4 road cut north of Jemez Springs (Kues 1996:170). Various volcanic rocks including rhyolite, andesite, basalt, and dacite occur in the Keres Group (Lavine et al. 1996), outcropping in the vicinity of Jemez Springs, including Paliza Canyon to the east. The sources of the generic cherts, metaquartzite, orthoquartzite, and quartz remain uncertain.

Table 2 shows the distribution of artifact types by stratum for Room 100. The assemblage is dominated by debitage (97 percent), augmented by small numbers of cores and tools. Over 60 percent of the assemblage came from the post-occupational strata, with only 30 percent coming from the unmixed cultural strata. Analysis indicated a predominance of core-flake reduction, accompanied by a much smaller amount of bifacial tool manufacture. Fifty-three formal and informal tools were identified, including drills (n=1), scrapers (n=2), bifaces (n=7), projectile points (n=12), strike-a-light flints (n=8), and utilized debitage (n=23). The occurrence of strike-a-light flints and a single strike-a-light flake was particularly interesting, because they represented the only evidence of historic period artifacts in the chipped stone assemblage. Most of the informal tools were obsidian (n=17), followed by chert (n=5), and basalt or andesite (n=1). All eight strike-a-light flints and the strike-a-light flake were chert. Obsidian also dominated the small assemblage of formal tools, with the drill, a scraper, six bifaces, and 10 projectile points being made from this material.

The formal and informal tools made up nearly 4 percent of the assemblage, and indicated the performance of a range of tasks, some directly and others indirectly. In addition to projectile points, indicating hunting activities, the condition of some of these tools implied hunting success, with meat being returned to the village for processing and consumption. Projectile points were likely manufactured at Giusewa, as indicated by the presence of two preform tips exhibiting manufacture-related breaks, and one point was refurbished after being broken. Other types of bifacial tools were also made here, as well as being used in various tasks including wood or bone working (drill) and leather working (scrapers). The informal tools augment this list of tasks. Informal tools were used in fire-making activities (strike-a-light flints), for hide working, wood-working, and general cutting and scraping activities. Thus, the tools in this assemblage indicate the performance of a fairly wide variety of tasks related to manufacture, maintenance, and food procurement activities of importance to the lives of the occupants of LA 679.

Table 2. Distribution of chipped stone artifact types by stratum; counts and row percentages.

Artifact morphology		Stratum 0	Stratum 1	Stratum 1/2	Stratum 2	Stratum 2/3	Stratum 3	Stratum 3/4	Stratum 4	Stratum 4/5	Stratum 5	Totals
Indeterminate	Count	–	–	–	1	–	–	–	–	–	–	1
	Row %	–	–	–	100.0%	–	–	–	–	–	–	0.1%
Angular debris	Count	3	15	17	129	5	121	39	81	64	5	479
	Row %	0.6%	3.1%	3.5%	26.9%	1.0%	25.3%	8.1%	16.9%	13.4%	1.0%	36.1%
Core flake	Count	4	20	25	274	20	188	68	123	111	9	842
	Row %	0.5%	2.4%	3.0%	32.5%	2.4%	22.3%	8.1%	14.6%	13.2%	1.1%	63.5%
Biface flake	Count	–	–	–	–	1	–	6	2	–	–	9
	Row %	–	–	–	–	11.1%	–	66.7%	22.2%	–	–	0.7%
Bipolar flake	Count	–	–	–	3	–	1	–	1	–	–	5
	Row %	–	–	–	60.0%	–	20.0%	–	20.0%	–	–	0.4%
Potlid	Count	–	–	–	–	–	–	–	–	1	–	1
	Row %	–	–	–	–	–	–	–	–	100.0%	–	0.1%
Strike-a-light flake	Count	–	–	–	–	–	–	1	–	–	–	1
	Row %	–	–	–	–	–	–	100.0%	–	–	–	0.1%
Tested cobble	Count	–	–	–	–	1	–	–	–	–	–	1
	Row %	–	–	–	–	100.0%	–	–	–	–	–	0.1%
Unidirectional core	Count	–	–	–	–	–	2	–	2	–	–	4
	Row %	–	–	–	–	–	50.0%	–	50.0%	–	–	0.3%
Multidirectional core	Count	–	1	1	–	–	3	–	1	5	–	11
	Row %	–	9.1%	9.1%	–	–	27.3%	–	9.1%	45.5%	–	0.8%
Bipolar core	Count	–	–	–	1	–	–	–	–	–	–	1
	Row %	–	–	–	100.0%	–	–	–	–	–	–	0.1%
Early stage uniface	Count	–	–	–	–	–	–	–	–	1	–	1
	Row %	–	–	–	–	–	–	–	–	100.0%	–	0.1%
Biface	Count	–	–	–	–	–	–	–	1	–	1	2
	Row %	–	–	–	–	–	–	–	50.0%	–	50.0%	0.2%
Early stage biface	Count	–	1	–	–	–	1	–	2	–	–	4
	Row %	–	25.0%	–	–	–	25.0%	–	50.0%	–	–	0.3%
Middle stage biface	Count	–	1	–	–	–	–	–	–	–	–	1
	Row %	–	100.0%	–	–	–	–	–	–	–	–	0.1%
Late stage biface	Count	1	–	–	5	–	2	2	2	1	–	13
	Row %	7.7%	–	–	38.5%	–	15.4%	15.4%	15.4%	7.7%	–	1.0%
Table Total	Count	8	38	43	413	27	318	116	215	183	15	1,376
	Row %	0.6%	2.8%	3.1%	30.0%	2.0%	23.1%	8.4%	15.6%	13.3%	1.1%	100.0%

Jemez Ethnogenesis Examined Using Chipped Stone Artifacts

Barbour and Ortega (2019:10) suggest that projectile point styles might provide insight into cultural affiliation, citing Woodbury (1954) as a possible example of differentiation between the Eastern and Western Pueblos. Specifically, they suggest that the presence of a concave base on side-notched projectile points is potential evidence for this differentiation (Barbour and Ortega 2019:10). However, while Woodbury (1954) drew comparisons between concave-based side-notched points in northeastern Arizona and straight-based side-notched points in the La Plata District (Morris 1939), as well as shallow concave-based side-notched points at Pecos Pueblo (Kidder 1932), he stopped short of calling this characteristic a defining feature between Eastern and Western Pueblos. Indeed, considering the very wide-spread nature of the various styles of projectile points produced in the prehistoric Southwest, these tools are difficult to use when attempting to examine ethnogenesis. As Justice (2002:289) notes:

> These are here dubbed Pueblo Side Notched Straight Base and Pueblo Side Notched Concave base, although for convenience they can simply be called Pueblo Side Notched. The types are mainly distinguishable on basal treatment alone without other distinguishing characteristics. The vast majority of site reports in the Southwest include both of these basal varieties. They are seldom found separately, and temporal or contextual distinctions are seldom addressed.

Ethnogenesis is "the process by which a social group comes to regard itself or be regarded as a distinct people" (Free Dictionary). Using a single artifact type to examine ethnogenesis or ethnicity is rarely possible, because artifact styles can be widespread, and artifacts can be traded between groups but are only indicative of the ethnicity of the group that produced them. An example of this is Red Mesa Black-on-white, a pottery type made in the southern San Juan region, that was heavily traded across a large area. It is the earliest type of painted pottery in the northern Rio Grande and was traded into the area and has no local ethnic affiliation. Thus, Red Mesa Black-on-white cannot be used to determine the ethnicity of the early residents of the northern Rio Grande, while it can be an ethnic marker for the southern San Juan region.

A more fruitful avenue for addressing questions of ethnicity is discussed by Clark (2007), who examines an array of cultural characteristics to construct a pattern of enculturation. Clark (2007:44) uses the term "enculturation" to refer to what many term ethnicity. Enculturation refers to basic social training that occurs within households as young members of a group learn from older members how to act properly. The enculturative tradition can be used to distinguish one group from another by looking for deeply embedded aspects of enculturation. Rather than examining the showy aspects of culture that might be used to express ethnicity, but can also result from exchange or emulation, evidence of group membership should be looked for in the more mundane aspects of life that represent enculturational information gained through behavioral training. These are the deeply embedded characteristics that carry canonical information about who you are and what group you belong to, without being an overt display of that membership.

In a study of Pueblo movement into the Hohokam area, Clark (2001) used these concepts to define several data sets that helped distinguish between immigrants and the original population. Types of data that were especially useful included: "...domestic spatial organization, foodways, and embedded technological styles reflected in the nondecorative production steps of ceramic vessels, textiles, walls, domestic installations, and other nonutilitarian items" (Clark 2001:18)

Thus, rather than considering individual artifact types as indicative of ethnicity, it can be more fruitful to examine how assemblages are structured. Wilson (2021) used this concept to compare the structure of ceramic assemblages from the Pojoaque Corridor Project in the northern Rio Grande with those of the northern Mogollon and San Juan regions to distinguish between accumulative and sequential traditions in assemblage structure. Accumulative assemblages tend to be conservative, with the manufacture of older pottery types continuing even as new styles are introduced. In contrast, sequential assemblages reflect changes that were more rapid and dramatic, with new types assuming an overwhelming and rapid dominance. Both the Pojoaque assemblages and northern Mogollon assemblages had accumulative natures, in contrast with those from the San Juan region which reflected a sequential assemblage structure.

This concept was also applied to projectile point assemblages from the Pojoaque Corridor Project (Moore 2021), with similar results. Northern Rio Grande projectile point assemblages are accumulative, with older styles continuing to be manufactured and used even as new styles are introduced. While the new styles may be most common, most earlier styles continue to be well-represented. Thus, even after side-notched styles were introduced to the northern Rio Grande, corner-notched points continued to be manufactured and remained common in assemblages.

Though the projectile point assemblage from Room 100 is small, it provides preliminary information about assemblage structure, which can be used to make assertions about ethnicity and ethnogenesis. This assemblage contains several identifiable styles (Figure 1) including corner-notched straight base (n=1), side-notched straight-base (n=1), and side-notched concave-base (n=3). At least one other corner-notched point was identified in the assemblage, but its base

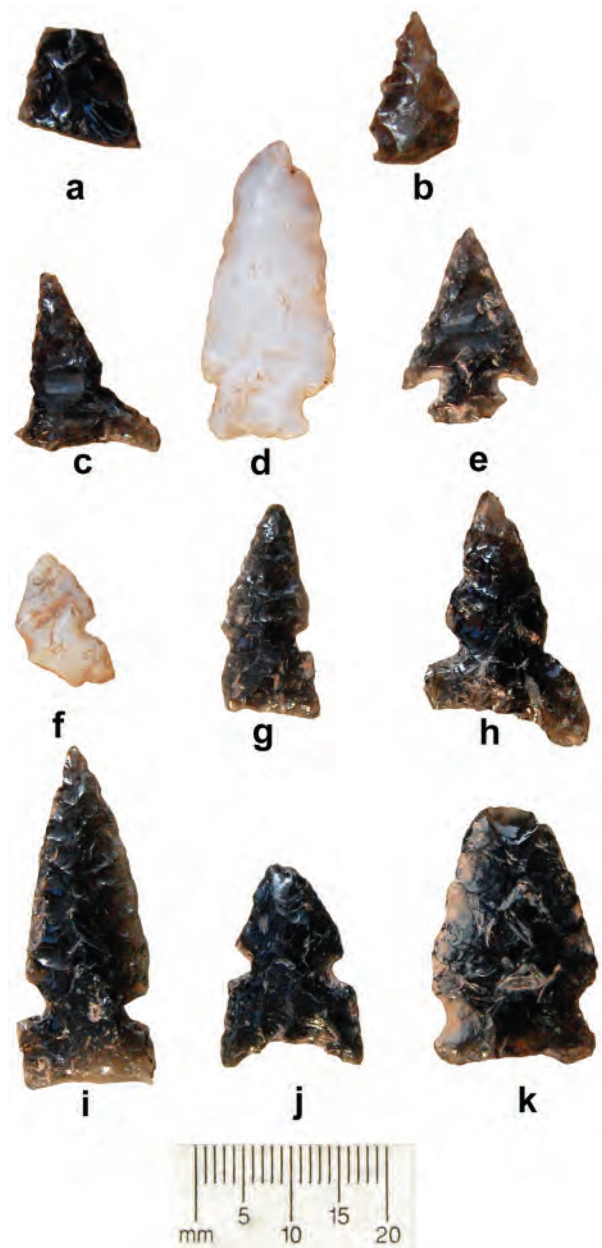

Figure 1. Projectile points from LA 679. Small projectile points: (a) obsidian midsection, (b) obsidian tip and midsection; Pueblo Corner-Notched: (c) obsidian tip and midsection, (d) Pedernal chert straight base, (e) obsidian straight base; Pueblo Side-Notched: (f) chert probable straight base, (g) obsidian straight base, (h) obsidian concave base,(i) obsidian concave base, (j) obsidian concave base, (k) obsidian concave base.

was missing, and a more specific style could not be assigned. This combination of multiple styles resembles the accumulative nature of northern Rio Grande projectile point assemblages as exemplified by the Pojoaque Corridor assemblage (Moore 2021). This contrasts with the sequential tendencies of San Juan region projectile point assemblages and suggests a cultural affinity of the inhabitants of Room 100 with the northern Rio Grande rather than Pueblo groups to the west in the San Juan region.

Acculturation to Spanish Technology

Rather than attempting to assimilate the Pueblo population, Spanish colonists allowed them to maintain a separate identity, though that identity was as second-class residents. While many Pueblo individuals did eventually assimilate and disappear into the Spanish population, most maintained their separate identity, retaining their own traditions though forced to alter many of them. Instead of being assimilated, the Pueblo population began to acculturate to Spanish culture. Interestingly, a key aspect of assimilation is that it is not unidirectional (Teske and Nelson 1974), and both colonists and native groups may change as they adopt aspects of the other's culture. Colonial period Spanish material culture reveals that this process was indeed two-way, with evidence for the adoption of many aspects of Pueblo lifeways by the Spanish (Moore 2004, 2017).

The question posed for this analysis was aimed at determining the amount of influence Spanish culture had on the Jemez people, and how rapidly and to what extent the Jemez people adopted aspects of Spanish culture (Barbour and Ortega 2019:10–11). This included the question of whether the Spanish might have actively tried to prevent the Jemez people from adopting certain items in order to maintain Spanish power.

Some chipped stone artifacts provide insight into Jemez acculturation to Spanish technology. Fire-making is an important task made easier by the use of flint and steel for striking sparks instead of using traditional methods like fire drills. The presence of eight strike-a-light flints in this assemblage (Figure 2), as well as a flake struck from a strike-a-light flint during use, makes it clear that at least some aspects of Spanish technology were rather quickly adopted by the Jemez because of their recognized usefulness. In this, the LA 679 assemblage is similar to that of a seventeenth century farmstead associated with Pecos Pueblo (Moore 2003). Eleven strike-a-light flints were found in that assemblage and represented the only evidence for acculturation to the Spanish at the site. No gunflints were recovered from Room 100, which could initially be taken for evidence that the Spanish were restricting the possession of firearms. However, since gunflints tend to be rare on most Spanish sites as well, their absence in a small Pueblo chipped stone assemblage is not definitive proof for that type of restriction.

Other than the strike-a-light flints, the rest of the chipped stone artifacts from Room 100 could be characterized as a typical Pueblo assemblage. As noted earlier, the tools recovered from this room were used in a wide range of activities, and there was no evidence that any specific types of chipped stone tools were replaced by alternatives obtained from the Spanish. Judging from the chipped stone assemblage, the level of acculturation to the Spanish during the period represented by the occupation of this room was fairly low, perhaps limited to the most useful commodities available.

Aspects of the Obsidian Assemblage

The extremely high percentage of obsidian in the assemblage is atypical of Pueblo residential sites and can be attributed to the close proximity of Giusewa to several major obsidian sources. This made determining the source(es) of obsidian from Room 100 highly important. Non-cultural damage to the surfaces of many obsidian artifacts was fairly

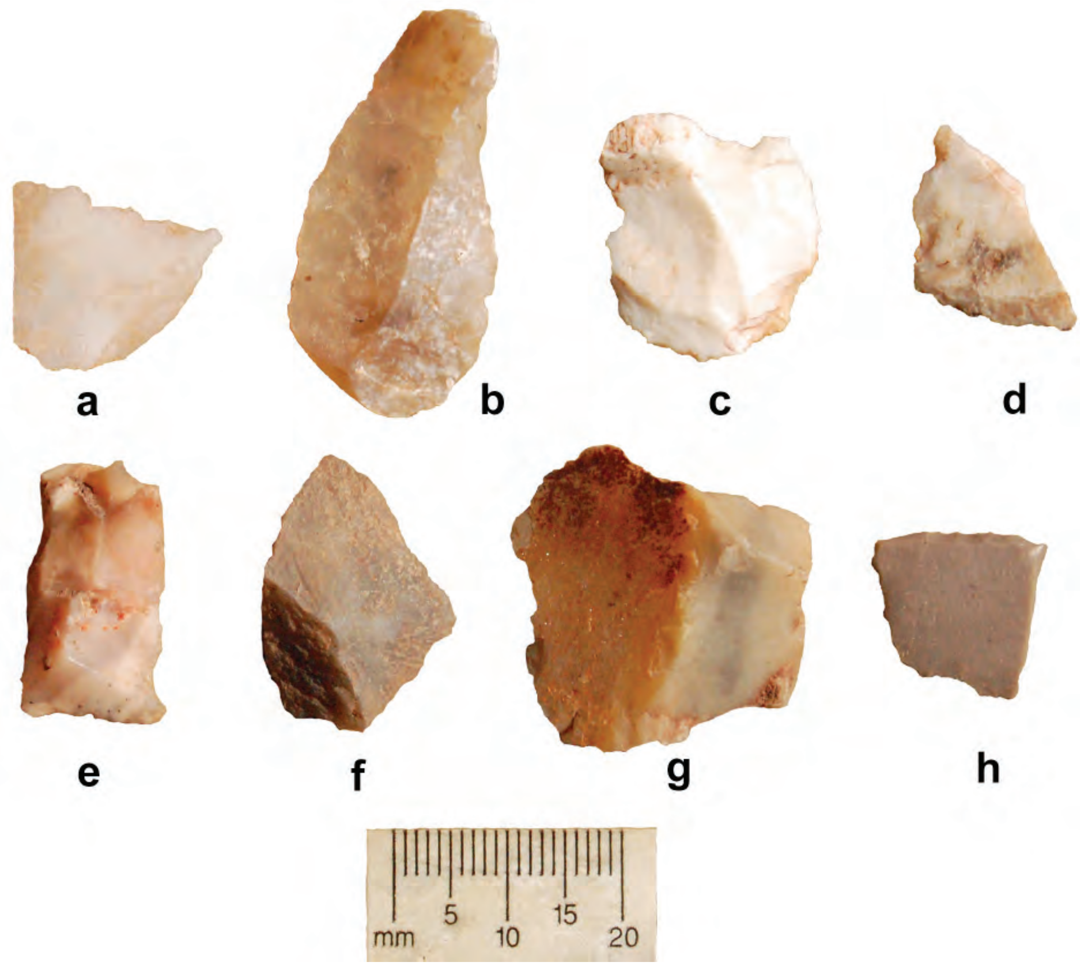

Figure 2. Strike-a-light flints from Room 100.

obvious and common, so the presence and type of damage on obsidian artifact surfaces was noted during analysis. Other materials were also examined for similar damage, but few comparable examples were found. Since the damage was on surfaces rather than along edges, it did not appear to be related to use. Thus, this characteristic became a second aspect of interest in examining the obsidian assemblage.

Obsidian Sourcing

Fortunately, obsidian is one of the few materials used in chipped stone reduction that can be traced to its original outcrop. X-ray fluorescence analysis (XRF) is an ideal choice for this purpose in most cases because XRF is inexpensive and non-destructive, thereby preserving the tested artifacts in their original condition. Unfortunately, knowledge of where the source was is not always an indication of where the nodule from which an artifact was struck originated. This is because rocks are subject to transport by erosion. Determining whether a piece of chipped stone debitage came from a nodule that was obtained at an outcrop or from gravel deposits along a stream, possibly at some distance from the source, can be accomplished by examining any cortical surface remaining on the debitage. Since not all debitage exhibits remnants of the cortical surface, a fine-grained assignment of source is not possible for every obsidian artifact. However, for those artifacts that exhibit cortex, we can get a much better idea of where they came from by using both cortex type and XRF sourcing data.

Overall, 66.2 percent (n=624) of the obsidian artifacts from Room 100 retained no cortical surface, including all nine (1.0 percent) that were visually identified as El Rechuelos obsidian from the north end of the Jemez Mountains. At least some cortical surface was visible on the 318 (33.8 percent) remaining pieces of obsidian. Of these, 112 specimens (34.8 percent) exhibited waterworn cortex indicating procurement from secondary deposits, and the remaining 210 specimens (65.2 percent) exhibited chemically weathered, non-waterworn cortex indicative of procurement from primary deposits.

This sets the initial context—cortex type data suggest that nearly two-thirds of the obsidian artifacts came from nodules collected at or near their primary sources. Since the remaining third were struck from nodules obtained in gravel beds, secondary deposits were a minor, but still very important source for this material. Since a large percentage of nodules came from primary sources, knowing just which obsidian sources were exploited became important. In order to gather more information on obsidian procurement, 52 obsidian artifacts were submitted for XRF analysis. Except for three specimens, the sample came from the lowest levels in the room—Strata 4 (n=25), 4/5 (n=22), and 5 (n=2). These contexts were sampled to ensure that the artifacts chosen for analysis were those that were most likely related to the early historic period occupation of Room 100.

To better determine the type of sources exploited, most specimens selected for analysis (47 of 49 artifacts from Strata 4–5) were cortical, with both waterworn and non-waterworn cortex represented. Three artifacts from Stratum 1/2 were analyzed to confirm the source assigned to them during analysis. Most varieties of Jemez obsidian cannot be visually distinguished from one another or from obsidians from other sources. El Rechuelos obsidian is an exception and can be visually distinguished because it contains abundant ash inclusions (Wolfman 1994:47). The specimens from Stratum 1/2 were defined as El Rechuelos obsidian, and confirmation for this identification was sought.

XRF analysis was conducted by M. Steven Shackley (2019), and Table 3 presents the results of his analysis. Four obsidian sources are represented: Cerro del Medio, Cerro Toledo, El Rechuelos, and Bearhead Rhyolite. All four sources are in the Jemez Mountains, with the Cerro del Medio, Cerro Toledo, and El Rechuelos sources outcropping around and within the Valles Caldera (Shackley 2005), and Bearhead Rhyolite obsidian outcropping to the east of Jemez Springs (Shackley et al. 2016). Cerro del Medio obsidian outcrops in a dome at Cerro del Medio, a peak in the east part of the Valles Caldera (Shackley 2005:71). Cerro Toledo obsidian outcrops in two locations—one on the northeast side of the Valles Caldera and a second at Rabbit Mountain on the southeast edge of the caldera (Shackley 2005:69). El Rechuelos obsidian occurs in a number of small domes to the north, west, and south of Polvadera Peak northeast of the Valles Caldera (Shackley 2005:68). Bearhead Rhyolite obsidian outcrops to the east of Jemez Springs in the southern Jemez Mountains (Shackley et al. 2016:52), and commonly occurs in Pueblo Revolt period sites in that area (Shackley et al. 2016:52).

As Table 3 shows, Cerro del Medio obsidian dominates this sample, followed distantly by Cerro Toledo obsidian, El Rechuelos obsidian, and finally Bearhead Rhyolite obsidian. Despite the close proximity of the Bearhead Rhyolite obsidian source to Giusewa, few artifacts made from this material were identified in the sample. Apparently, occupants of Room 100 were willing to travel longer distances to obtain obsidian from sources farther to the north, suggesting that obsidians from those sources were considered to be superior.

The only sourced samples of El Rechuelos obsidian came from Strata 1 and 2 that eroded into Room 100 following abandonment. Those post-

Table 3. Sourced obsidian samples; counts for each source by stratum and cortex type.

Source	Stratum 1/2			Stratum 4			Stratum 4/5			Stratum 5				
Cortex type[a]	**WW**	**NWW**	**None**	**WW**	**NWW**	**None**	**WW**	**NWW**	**None**	**WW**	**NWW**	**None**	**Total**	**Percent**
Cerr del Medio	–	–	–	8	9	–	9	11	2	2	–	–	41	78.8%
Cerro Toledo	–	–	–	2	3	1	–	–	–	–	–	–	6	11.5%
El Rechuelos	–	–	3	–	–	–	–	1	–	–	–	–	4	7.7%
Bearhead Rhyolite	–	–	–	1	1	–	–	–	–	–	–	–	2	3.8%
Total	0	0	3	11	13	1	9	11	2	2	0	0	52	100.0%
Percent	0.0%	0.0%	100.0%	44.0%	52.0%	4.0%	40.9%	50.0%	9.1%	100.0%	0.0%	0.0%		

[a]WW = waterworn cortex; NWW = non-waterworn cortex; None = no cortical surface

occupational strata contain abundant artifacts. While those artifacts can be attributed to the occupation of Giusewa, their actual dates cannot be determined, and they are assigned to the general occupation of the site. In contrast, Strata 4 and 5 (and Stratum 4/5) were related to use of Room 100 because they represent floor and roof deposits originating during its seventeenth century occupation.

Both waterworn (n=19) and non-waterworn cortex (n=20) occurs on the samples from Cerro del Medio, suggesting that primary and secondary deposits were equally important sources for this type of obsidian. While most Cerro del Medio obsidian is confined to the interior of the Valles Caldera, some escapes and is transported by the East Jemez River and San Antonio Creek, though nodules tend to be very small (Shackley 2005:71). Cerro del Medio obsidian nodules also occur in Jemez River gravels just north of Jemez Springs (M. Steven Shackley, personal communication, 2019). Cerro Toledo obsidian in the assemblage also came from both primary (n=3) and secondary (n=2) sources, as did Bearhead Rhyolite obsidian (one apiece). While the Bearhead Rhyolite obsidian was easily obtained from either type of source within 10 km or less from LA 679, collecting Cerro Toledo obsidian was a different matter and would either entail a longer journey than was required for obtaining Cerro del Medio obsidian or trade with groups having access to this material on the Pajarito Plateau. Which of these may have been the case cannot be determined using chipped stone data alone.

Cerro del Medio obsidian dominates the sample from the lowest strata in Room 100, and this compares favorably with the results of obsidian analysis at ancestral Jemez sites conducted by Liebmann (2017) in which this was the most abundant variety at 21 of the 31 sites he sampled. Cerro del Medio obsidian was also important to other groups in the northern Southwest, however, including the ancestral Tewa in the Pojoaque Valley and on the Pajarito Plateau, and ancestral Keres in the San Juan region (Shackley and Moore 2018; Moore et al. 2020). Cerro del Medio obsidian may have been considered superior because nodules of this material tend to contain fewer spherulites in comparison with other Jemez sources (Shackley 2005:70), making it more easily and consistently knappable.

Surface Damage on Obsidian

Chipped stone artifacts, especially those made from soft materials, can suffer damage through use or after being discarded. Post-depositional damage can occur as scratches and scrapes on non-cortical surfaces, as well as edge attrition. Obsidian can also develop a hydrated rind that is sometimes distinguishable by the naked eye or under low magnification. Debitage can exhibit edges damaged by use as cutting and scraping tools, usually defined by the presence of small scars along an edge and/or abrasion on and immediately adjacent to an edge. Conservative standards were applied when differentiating between use-related and post-depositional damage, because trampling and mechanical transport can cause scarring that could be mistaken for cultural wear. This was a particular problem with the LA 679 assemblage since 44.4 percent of the obsidian artifacts exhibited scuffs and scratches indicative of post-depositional damage (Figure 3). Debitage exhibiting this type of damage were eliminated as informal tools because the source of edge damage could not confidently be attributed to cultural use. Fresh scars along the edges of an obsidian artifact often exhibit a sheen that does not appear in scars created during the original use of a piece of obsidian debitage as a tool. When scarring along an edge exhibited the sheen indicative of recent damage, that artifact was not considered to be a tool. The high percentage of obsidian in this assemblage helps make clear how much damage has occurred to the chipped stone artifacts from Room 100. Most of that damage was probably caused by foot traffic on the roof of Room 100 as well as in adjacent areas where discarded obsidian artifacts lay on the surface.

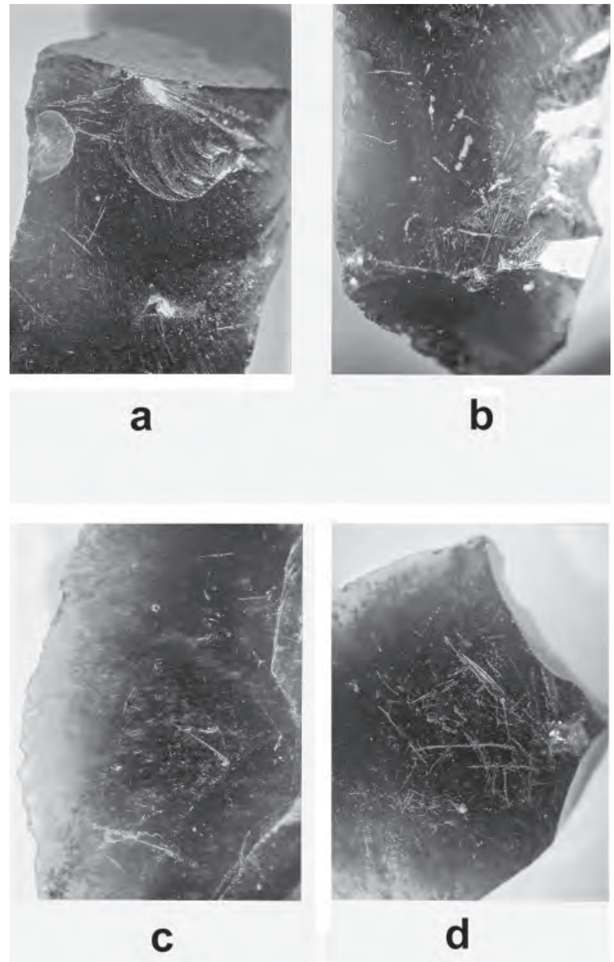

Figure 3. Microphotographs of post-depositional damage to obsidian debitage surfaces: (a) scratched, central scratch is 2 mm long; (b) scuffed and scratched, width at center is 7 mm, (c) scratched, longest scratch is 4 mm long, (d) scuffed and scratched, longest scar is 4.5 mm long.

Table 4 shows the distribution of damaged and undamaged obsidian artifacts by stratum, with the three specimens from Stratum 0 eliminated. The lowest percentage of damaged obsidian artifacts occurred in Stratum 2/3, which contained materials washed into the room. At 15 percent, the rate of damage in this stratum still seems comparatively high. At first glance the cultural strata appear to contain a much higher percentage of damaged obsidian artifacts than the post-occupational strata, but this is not actually the case. At 45.2 percent, the proportion of damaged obsidian artifacts in the

Table 4. Stratum by presence/absence of damage for obsidian artifacts; counts and row percentages.

Stratum		Undamaged	Damaged	Total
Stratum 1	Count	11	9	20
	Row %	55.0%	45.0%	2.1%
Stratum 1/2	Count	10	20	30
	Row %	33.3%	66.7%	3.2%
Stratum 2	Count	147	141	288
	Row %	51.0%	49.0%	30.6%
Stratum 2/3	Count	17	3	20
	Row %	85.0%	15.0%	2.1%
Stratum 3	Count	113	95	208
	Row %	54.3%	45.7%	22.1%
Stratum 3/4	Count	64	19	83
	Row %	77.1%	22.9%	8.8%
Stratum 4	Count	80	78	158
	Row %	50.6%	49.4%	16.8%
Stratum 4/5	Count	75	49	124
	Row %	60.5%	39.5%	13.2%
Stratum 5	Count	4	4	8
	Row %	50.0%	50.0%	0.8%
Total	Count	521	418	939
	Row %	55.5%	44.5%	100.0%

cultural strata (4, 4/5, and 5) is actually lower than the post-occupational strata (0, 1, 1/2, 2, 2/3, 3, and 3/4) at 49.1 percent. This suggests that similar processes were responsible for damage in both cases.

Obsidian is a rather soft stone, with a hardness of 5–5.5 on the Mohs scale compared to 7 for chert. This softness makes obsidian more susceptible to being scratched or scraped when stepped on or otherwise ground into underlying deposits. The damage on these artifacts occurs as scratches and scrapes, exactly what would be expected to occur if artifacts were exposed on a surface and walked over. This would be the case if flintknapping was done on the roof and/or floor of a room, with some debris remaining in place after knapping ended. Subsequent foot traffic could damage exposed debris, and the same would occur if obsidian was knapped or discarded outside but near a structure.

The presence of numerous pieces of obsidian debitage in the roof deposits suggests that the roof was a locus in which flintknapping occurred, and that at least some debitage remained there after knapping ended. While such a provenience represents a primary discard location, the damage found on many obsidian artifacts indicates that trampling and probably some movement of those materials occurred after deposition. Similarly, a large percentage of obsidian artifacts in strata deposited in the room following its destruction and abandonment were also damaged. The type of damage on the latter would not be expected in a primary disposal area where trash deposits would have built up fairly rapidly. Surface traffic over such deposits above the collapsed roof of Room 100 would be risky, because people would have to walk through a depression where footing might be treacherous.

Damage to obsidian artifacts in the post-occupational strata probably occurred before they arrived in Room 100, on the adjacent surface where foot traffic would have been more likely. This damage could have occurred before Room 100 was burned or after that event, or both. When those artifacts were damaged is less important than the fact that they were likely deposited in Room 100 after they were damaged, because this provides important information about the formation of the post-occupational strata. Rather than being deposited purposely into Room 100, the materials in the upper three strata washed in after the room was abandoned and represent secondary deposition. Artifacts in the cultural strata originated on or in roof materials, and fell into the room when the roof collapsed, especially those in Strata 4 and 4/5. Since Stratum 5 was the lowermost 10 cm above the floor, the artifacts in that stratum include those that were on or just above the floor at the time of destruction, possibly mixed with some that were in roof materials. Thus, the cultural strata were primary deposits, and the damage visible on the surface of artifacts from that context occurred while they were on roof or floor surfaces and vulnerable to impact by foot traffic. The taphonomic meaning of these artifacts only becomes clear when the nature and location of the deposits within which they were found are known.

Conclusions

In addition to many of the usual questions asked about chipped stone assemblages, this study posed several non-traditional and more complex questions. In most ways, the chipped stone artifacts from Giusewa represent a typical Pueblo assemblage. The reduction strategy used to strike debitage for use or transformation into formal tools was characteristic of Pueblo assemblages, as was the array of formal and informal tools. The only atypical aspect of the assemblage was the very high percentage of obsidian artifacts, and this was explained by the proximity of the village to multiple obsidian sources.

Using the small projectile point assemblage to examine Jemez ethnogenesis provided very tentative results. Rather than using specific artifact types as indicators of ethnicity, the composition of the projectile point assemblage was examined, suggesting an affinity with Tanoan groups in the northern Rio Grande. However, this was far from conclusive. A more detailed analysis of an array of attributes of material culture, foodways, and house construction styles might provide a better idea of the degree of affinity to other cultural groups in the northern Southwest.

More satisfactory answers were derived for the other questions that were asked. In looking for evidence of adoption of Spanish technology, we found that the level of acculturation during the period represented by the chipped stone assemblage from the cultural strata in Room 100 was fairly low, perhaps limited to the most immediately useful commodities available. These apparently included steel *chispas*, or strike-a-lights, which were a very useful addition to the traditional repertoire of fire-making techniques. Otherwise, the traditional uses of chipped stone tools appear to have been maintained.

Surprisingly, XRF analysis showed that the most common types of obsidian used by occupants of Room 100 were not from the closest source to the village. Cerro del Medio obsidian was most common, followed by Cerro Toledo obsidian, and finally by Bearhead Rhyolite obsidian. All three varieties were obtained from both primary and secondary sources. While Bearhead Rhyolite obsidian was available from deposits comparatively near Giusewa, sources for the other two varieties were more distant and less convenient to access, especially Cerro Toledo obsidian. This suggests that, despite the proximity of deposits of Bearhead Rhyolite obsidian, it was probably not considered to be of the same quality as the other types, making travel to more distant sources a desirable option.

The types of damage on obsidian artifact non-cortical surfaces and their prevalence in the assemblage were considered indicative of the impact of traffic over the surface of the site. Obsidian's softness makes it susceptible to scrapes and scratches when stepped on and ground against materials like quartz sand and harder rocks. This damage indicates that an artifact was lying on the surface for some time before being buried. We concluded that damaged obsidian artifacts in the lower strata (4, 4/5, and 5) were likely impacted by being on a roof or floor surface before the room burned. Those in higher strata (1, 1/2, 2, 2/3, 3, and 3/4) appear to have been on the general site surface before being washed into the room with other materials, covering the collapsed roof. While the secondary nature of the upper deposits in Room 100 was suspected, this analysis provided corroborating evidence for the erosional processes responsible for deposition of those materials.

By asking more complex questions than those traditionally posed for chipped stone assemblages, we were able to elicit information generally not considered to be within the realm of chipped stone analysis. While in some instances the answers we derived were tentative, they show the utility of such inquiries, and can be augmented by the results of other analyses, providing a fuller and more detailed view of past human behavior.

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Archaeology as Dynamic Interpretation: A Community Excavation and Laboratory Exhibition at Jemez Historic Site

ETHAN ORLANDO ORTEGA

Figure 1. Aerial drone image of Jemez Historic Site facing east, courtesy of Brendon Kehoe, 2018.

Project Overview and Need

Jemez Historic Site (LA 679, Figure 1) is an archaeological property in Jemez Springs, owned by the New Mexico Department of Cultural Affairs, which is an entity of the New Mexico state government. The property is listed on the National Register of Historic Places, the State Register of Cultural Properties, and is designated as a National Historic Landmark. Jemez Historic Site preserves 6.5 acres encompassing an estimated one-third of the ancient village of Giusewa and the entirety of the seventeenth century San Jose Mission Church complex. The property is managed jointly by New

Mexico Historic Sites (NMHS) and by the sovereign nation of Jemez Pueblo. This joint relationship was established through a memorandum of understanding between the two entities in 2012 (Museum of New Mexico Board of Regents 2012). To inspire a paradigm shift for how government-funded cultural institutions can generate new interpretations about the past, New Mexico Historic Sites' model redefines community participation in the archaeological process. This article focuses on the theory, interpretation practices, and volunteer engagement of a community excavation project that took place at Jemez Historic Site in the fall of 2018 and the spring of 2019.

For more than four decades, Jemez Historic Site's public interpretation relied on text-heavy wayside signs outside and content-light information panels within the museum. Occasional lecture events and ranger-led tours were offered, although the typical visitor experience was a self-guided tour reliant on a printed trail guide. These traits place existing interpretation methods of Jemez Historic Site in the Systematic Museum designation on Hein's (1995:22) spectrum. The theory of interpretation that falls into the systematic category is founded on the idea that learning is an incremental accumulation of knowledge to gain a complete understanding of a given subject. Tactics used by this approach focus on interpretive approaches on text and traditional lecture (Hein 1995:22). Museums in this theoretical realm also believe that knowledge exists outside of the learners who, in seeking understanding, gather it from entities outside of themselves.

Previous archaeological work at the site had primarily focused on structures related to the Spanish intrusion and occupation of the site, such as the mission church and associated buildings, and was conducted in the early twentieth century. Limited cultural resource management excavations in the form of salvage archaeology were performed during the summer of 1965 by Laurens Hammack, an archaeologist associated with the Laboratory of Anthropology, to recover data from a portion of the site that would be impacted and partially destroyed by visitor center and water pipeline upgrades (Wiseman 2017:1). This project was conducted hastily and had minimal involvement from Jemez Pueblo. It unearthed several rooms and thousands of artifacts, but funding was never allocated for processing of the recovered artifacts, their analysis, or report preparation (Wiseman 2017:2).

In recent years, Jemez Pueblo has been supportive of archaeological projects on ancestral Towa sites in the area, as well as work within the still-occupied village of Walatowa. This interest emerges out of a complex history and debate amongst people within the village, as well as archaeologists, about Jemez origins and the founding of various settlements within the Jemez Mountains. During the seventeenth century, pressures from intercultural violence between the Towa and Europeans as well as Catholic religious oppression led to a drastic drop in population in the Jemez Valley from an estimated 30,000 inhabitants at contact to less than 1,000 after the Pueblo Revolt of 1680 (Barbour 2018:6-7). Eventually, the relocation practice of the Spanish (termed *reducción*) forced almost the entire Towa ethnic group into a single village known as Walatowa that is still inhabited today. As a result, long-developed oral histories about origins, migration, and every other possible aspect of life from throughout the Jemez Valley and Valles Caldera were suddenly thrown into competition with one another within the village. To this day, oral traditions such as histories, place names, and affiliations are numerous and complex within the community. During a community feedback workshop lead by Andrew Merriell and Associates, Jemez tribal members showed interest in comparing their complex and sometimes contradictory oral histories with archaeological work (Andrew Merriell and Associates 2015:16-17). Giusewa provides a great opportunity to archaeologically explore Jemez prehistory as it is one of the longest occupied sites in the area and that it was one of the last major villages in existence before the forced consolidation by Europeans.

Project Goals and Scope

This project was designed to complement NMHS's broader public archaeology program. The following goals were developed with the assistance of Matthew Barbour (Regional Manager) and Patrick Moore (Director of NMHS) to enhance community engagement and interpretation of the broader community archaeology program.

1. Increase visitation and engagement with local communities
2. Modernize the interpretive experience at Jemez Historic Site
3. Interpret Jemez history and culture
4. Develop volunteers' concept of how the archaeological process works
5. Generate advocates for the preservation of NMHS

Process

Research Design and Tribal Collaboration

During the fall of 2017, meetings were arranged between NMHS, the Jemez Pueblo Tribal Historic Preservation Officer, and the current Jemez Pueblo tribal governors. These meetings occurred over the course of several months and were both formal and informal in nature. The purpose was to discuss the potential of an archaeological project at Jemez Historic Site as well as to gauge the interest in and feasibility of a community-based archaeological program. NMHS proposed that the project would be guided by community-based participatory research theory in which Jemez Pueblo would help shape the research design, including initial research hypotheses, location of the project, scope of work, object handling, and assist with interpretation of the results. The following quote from Jemez Tribal Governor Paul S. Chinana in a letter responding to formal consultation about the proposed archaeological work at Jemez Historic Site (Chinana 2018:1) demonstrates tribal support and interest in the project.

> The proposed archaeological investigation at Jemez Historic Site has the potential to expand our knowledge and understanding of Jemez History. It seeks to examine the cultural links which connect the Jemez People to the Jemez Mountains, the Valles Caldera, and other regions of the greater American Southwest. This is of great importance to our people.

The letter from the governor also established a clear expectation that a tribal member would always be present and actively participate in the excavations.

In past archaeological excavations the primary focus of the work was the Spanish structures, primarily the large ruins of the San Jose Mission Church. To begin moving the site's narrative away from a biased focus on the Spanish culture present at the site, Jemez tribal representatives selected an unexcavated roomblock to be the focus of the community-based archaeology project.

The selected area (Figure 2) was a 1.5-m-high mound with artifacts and architectural stones visible on the surface. The mound is directly north and west of known rooms that were excavated in the 1960s (Wiseman 2017:2). It is also located directly west of the main visitor loop trail at the site and within 200 ft of Highway 4, providing easy access to visitors. It was agreed that the project would locate and excavate one pueblo room. This scope of work defined in collaboration with Jemez Pueblo was combined by NMHS staff into a data recovery plan (Barbour 2018) which was submitted to the New Mexico Historic Preservation Division for review in February of 2018. The entire package was approved by the Cultural Property Review Committee on April 13, 2018. On August 11, 2018,

Figure 2. Proposed excavation area at Jemez Historic Site (LA 79) facing east.

Tribal Governor Paul S. Chinana, First Lieutenant Governor Byron Yepa, and Second Lieutenant Governor (Pecos Governor) Peter M. Madalena broke ground on the excavation as part of the Jemez Pueblo Independence Day Celebration (Figure 3).

Figure 3. Jemez Tribal Governors breaking ground for "Dig Giusewa", photo courtesy of Marlon Magdalena.

Volunteer Recruitment and Coordination

After receiving state and tribal approval in April of 2018, community volunteer recruitment began. A press release was drafted by Matthew Barbour and the author, then reviewed by Jemez Pueblo and the Department of Cultural Affairs' Museum Resource Division. This release was distributed throughout the state and across various social media platforms over a period of seven months from April to October of 2018. An online volunteer application form was created and was easily accessible from the nmhistoricsites.org website. Volunteers accepted for the project were required to be tribal members, students, or members of the non-profit Friends of Coronado and Jemez in order to assure liability insurance coverage while participating in field activities during the project. Membership in the Friends group was also served as a fundraising tool to offset the costs of the excavation and coordinated exhibition project. Volunteers were selected based on a simple criterion—tribal members were given preference, then the available positions were filled a through first-come first-served approach.

Initially, ten weeks of excavations were scheduled from August 16, 2018 to October 27, 2018, but due to the large amount of cultural materials encountered the project was extended into the spring of 2019. The work week was defined as Thursday, Friday, and Saturday, weather permitting, with field activities carried out from 9:00 a.m. to 3:00 p.m. in the afternoon. The established excavation schedule allowed for 120 registered spots, and after assignments were made, remaining potential participants were added to a wait list and called when volunteers canceled or on additional project days outside of the established schedule.

All participants were required to attend an orientation and training meeting led by Historic Sites staff held at Coronado Historic Site on August 3, 2018 covering the scope of the project and what was expected from volunteers. A broad cultural history of the Jemez Valley and Jemez Historic Site, an introduction to archaeology, and interpretation overview were included. Project staff also guided volunteers through a discussion of cultural competency in an archaeological setting, this information was derived from various Department of Cultural Affairs policies as well as training materials that had been created by NMHS staff previously. All volunteers were also required to read the last excavation report focused on Giusewa entitled, *Giusewa: Laurens C. Hammack's 1965 Excavations for the Visitor Center Water Line at Jemez Historic Site, Sandoval County, New Mexico.* This publication was available for purchase from Jemez Historic Site as a fundraiser for the project, and copies were made available in the volunteer libraries at each site. Finally, pre-project and post-project surveys were created to gain more information about the volunteers and to gauge their understanding of archaeology and the history of Jemez Historic Site before and after participating in the project.

Artifact Laboratory Exhibition Concept

The only public structure at Jemez Historic Site has limited interior space and serves as the visitor center, exhibition space, and restrooms facilities. When visitors arrive at the site, they enter a small lobby space with reception desk and office space and encounter an exterior door that exits to the trail head as well as an interior doorway that leads to the exhibition space. The exhibits on display had been in place since the 1970s. The text of this display was minimal, although it was well written and from a Towa (Jemez) perspective. The artifacts on display were limited to four cases with associated information panels touching on prehistoric life at Giusewa Pueblo, Spanish contact and the San Jose Mission, the Jemez revolts against the Spanish, and life in the American Period. This exhibition was didactic in nature with little connection to the Jemez people today or information about how the current understanding of the area's cultural history was generated. According to an evaluation of the old exhibition conducted by Merriell and Associates in 2015, visitors spent very little time engaging with the displays and primarily used the space as access to the restrooms that are located at the rear of the exhibition hall (Andrew Merriell and Associates 2015:16-17).

During the creation of the project scope and its budget, NMHS's Director, Patrick Moore, committed $35,000 toward a new exhibition about the ongoing archaeological and ethnographic research at the site. This exhibition was commissioned from New Mexico Highland University's program in interactive cultural technologies and scheduled to open in May of 2019. As a result, the regional manager of Jemez Historic Site, Matthew Barbour, agreed to the removal of the out-of-date existing core exhibition in the visitor center. Along with consent from the tribal representatives and community stakeholders, he agreed to the design and construction of a temporary exhibition, called the *Artifact Laboratory*, which featured the work from the community archaeological project and would serve as the field laboratory for processing artifacts that were recovered during the 2018 community excavation.

The design and themes for the *Artifact Laboratory* temporary exhibition were inspired by the University of Washington Burke Museum's exhibition entitled *Testing, Testing, 1–2–3: Work in Progress* (Burke Museum 2017). This temporary exhibition was a behind-the-scenes look at how museum artifacts are processed. The Burke was moving into a new museum building and as a result had spent several years inventorying, condition reporting, treating, packaging, and moving each of their over 16 million cultural, biological, and geological objects. The Burke took up this monumental task as a challenge and created an exhibition space that used the day-to-day activities of the museum move as a dynamic interpretation experience for the museum visitors. The exhibition space was designed with workspaces for museum professionals and public spaces for interactive exploration. The dynamic nature of the exhibition generated conversations in several forms, including staff and visitor interactions, accessibility of objects for visitors, and a unique experience with rotating artifacts each time the installation was visited. Inspired by the results, this model was adopted and adapted for the Jemez *Artifact Laboratory* temporary exhibition to enhance interpretation and provide experiences that spark conversations about Jemez culture and history.

Thematic Development

The first step taken to shape the exhibition representing the community archaeology project was to develop a "Big Idea," based on Beverly Serrell's criteria (2015:7-11). Expanding from themes in the Data Recovery Plan (Barbour 2018:10-12) and incorporating aspects of Community Based Participatory Research outlined by Sonya Atalay (2012:2-4), the following "Big Idea" statement took form: "*Artifact Laboratory:* The journey of an artifact from excavation to curation can generate new perspectives on history." In line with Serrell's format, the subject of this big idea was the artifacts, the action was their journey, and the desired outcome was the generation of new perspectives on history. Following the thread of the "Big Idea," several thematic topics were identified to carry the narrative and visitor through the space. The overarching theme for the exhibition was accessible archaeology, and the three sub-themes were: the history of Giusewa Pueblo, the archaeological process, and community archaeology (Figure 4).

Design Thinking

In order to design an engaging dynamic interpretation experience that also would serve as a functional field laboratory, several techniques were employed. Wrong Theory Protocol as put forth by Vanessa Svihla (2018), was used as a pre-ideation activity to seek a wholistic and empathetic

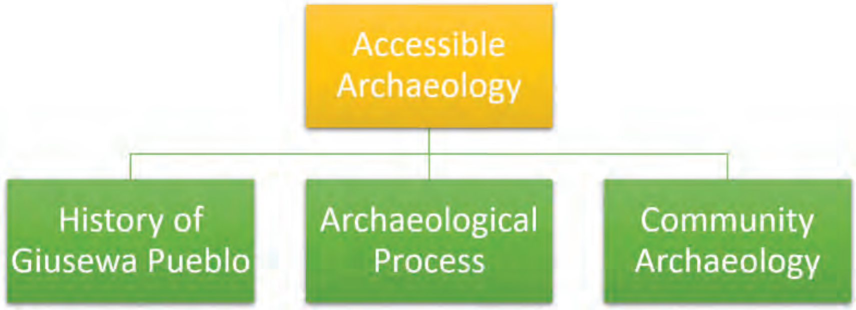

Figure 4. Theme and subthemes of the Artifact Laboratory exhibition.

understanding of the project design needs and constraints. This technique approaches the project by framing the problem first. Using this process, design constraints are identified and denoted as to whether they wearere flexible or not. Apropos to the *Artifact Laboratory* exhibition, design constraints were identified as:

- Limited budget (not flexible)
- Accessible workstations (flexible)
- Secure object storage (not flexible)
- Dynamic interpretation (flexible)
- Legal obligations (not flexible)

Community involvement, cultural competency, and ethnical and professional research were the project needs identified through previous stakeholder surveys conducted by Merriell and Associates in 2015, visitor comments online and in the onsite guestbook archive, Department of Cultural Affairs policies, and State and Federal legal obligations as identified in the data recovery plan (Barbour 2018:2, 13).

The second step of the Wrong Theory Protocol is aimed at generating the worst idea possible (in a hypothetical sense) to address the problem. During this process the following hypothetical "bad idea" was generated:

> Only allow pro-archaeologists to conduct excavations and laboratory processing. Run project on days the site is closed (Mon & Tue) or better yet when the visitors are on-site and erect walls to block the activities from view. Make visitors take a test on the history of Giusewa as soon as they arrive at the site, and don't let them enter if they get it wrong. Tell them they don't deserve to see the process because they don't know enough. Only put artifacts on display or online that are culturally sensitive. Don't document the findings, mix them up or sell them as souvenirs. Go over budget and don't tell the cultural stake holders what you are doing. Provide a one-sided view of history and expect everyone to accept it.

Upon review of the bad idea, it was recognized to be eerily similar to past practices in archaeology during the early twentieth century. This realization was used to evaluate and adjust the previously established constraints and needs (outlined above). Attempting to look at the bad idea from various perspectives, and by sharing it with coworkers, it was acknowledged that a fourth need was necessary to add to the list: transparency. Transparency throughout the archaeological process engages the community and builds trust with cultural stakeholders (Atalay 2015:15, 25).

After using Wrong Theory Protocol to identify boundaries, several techniques were selected from Keith Sawyer's *Zig Zag* (2013) to begin generating ideas for the exhibition. An overarching technique called Set an Idea Time (Sawyer 2013:149) was used to designate and require a 20 to 30-minute time commitment for each session. Several rapid-ideation activities like Make Remote Associations (Sawyer 2013:158) were used to generate as many ideas (good or bad) within the time allotted. Due to the author's busy work and school schedule, the Cook on All Burners (Sawyer 2013:162) technique in which working on many different projects at once can increase creativity and cross-pollination of ideas was involuntarily employed.

Building on the rapid ideation process, concepts were applied and tested in a virtual representation of the Jemez Visitors' Center (Figure 5). Designing and prototyping in virtual reality can save time and money, reduce the cost of fabrication, and identify design issues before physical installation begins (Sass 2005:326, 335-336). Trimble's SketchUp was used to create a virtual model of the Center's space including windows, doorways, architectural details, and even electrical outlets. Layouts, furniture and information panels were virtually rendered, each design being adjusted to fit the space.

An example of how virtual rapid prototyping helped the *Artifact Laboratory* exhibition is the design of the workstations. Initially, the workstations were envisioned as custom tables with plexiglass windows. These workstations would be able to be sealed leaving artifacts on display on the tables. After the virtual prototypes were generated however, NMHS staff and stakeholders thought that the plexiglass windows defeated the idea of accessible archaeology, and the cost to create the stations would exceed the budget. Subsequently, the furniture for the exhibition was redesigned to have one central locking storage case for artifacts with a simplified version of the workstations.

Once a virtual design was agreed upon for the exhibition, various images were generated to use as illustrations in a funding request to the Friends of Coronado and Jemez Historic Sites. Several spherical images were also generated, allowing board members of the Friends organization to use a phone-based virtual reality headset to view the interior spaces of the exhibition. These virtual prototypes aided the board members in their understanding of the exhibition content and

Figure 5. Sketchup rendering of the Artifact Laboratory virtual design.

helped secure $2,000 from the group to support the exhibition.

Artifact Laboratory Installation and Visitor Experience

The final design of the *Artifact Laboratory* exhibition featured nine content areas and two workstations, most of which were dynamic and adaptable as the excavation progressed. Digital displays, such as LED monitors and projectors, were selected to accommodate the need for rotation and updates of information throughout the project. Low-cost prints of informational text and clamps were used as a cost-effective alternative to professionally produced information panels. The incorporated pegboards also served a functional purpose for supply storage in the laboratory. For information that was updated daily, clipboards were used throughout the installation with in-house printed letter-size information cards or hand-written interpretations.

Four display cases were utilized to display artifacts from the ancient village of Giusewa. As the visitors entered into lobby area, they were greeted by staff, and there was an "introduction to community archaeology" information panel and a display case discussing the ground-breaking of the excavation and the shovel used by the tribal governors. This entry area also served as a storage area for the excavation tools. Visitors were encouraged to explore the site and exhibition in any order. They could begin outside and follow artifacts from excavation to the laboratory, or they could start at any point within the installation and not be lost. This freedom to explore and focus on aspects of interpretation is what places this exhibition in the constructivism realm discussed by Hein (1995:22).

As the artifacts were brought in the laboratory, they were dropped off at the first workstation, where they were inventoried and cataloged as objects. Surrounding this workstation within the exhibition were panels discussing the project and history of Giusewa Pueblo. Passing from the first workstation to the second, the visitor passed a display case used as a secure drying rack. Metal shelves were installed in the large case so that all of the artifacts from the week could be laid out on trays to dry and be viewed by visitors. This case was emptied at the beginning of each week to make room for the new week's artifacts.

At the second workstation artifacts were cleaned and/or packaged for curation. This was the station that created the most interest within the installation by far. Visitors were encouraged to help volunteers and staff clean artifacts, and this is where people were allowed to handle the excavated objects in a controlled setting. Behind the workstation, a pegboard was installed on the wall to hold supplies and two information panels discussing the archaeological process and what had been uncovered to date. To the right of this workstation was a floor to ceiling projection of photos from the excavation with a bench to create a miniature theater space. Images were added every week to this slideshow and provided visitors with a review of the progression of the project.

Looping back around the room, visitors passed an accent wall featuring hand-painted representations of designs from artifacts within the exhibition. Beyond the accent wall, the visitor encountered a large wall-mounted display case, which housed all the artifacts that were prepared for curation. This case illustrated and interpreted the large number of artifacts that typically are recovered from an excavation. To the right of this case was an information panel that discussed where the artifacts were stored after they were studied and packaged. The next display case featured complete reconstructed artifacts that were excavated during the 1965 project at Giusewa Pueblo. This case provided visitors with an illustration of what some of the excavated artifacts could look like once they were restored by conservators.

Finally, as visitors approached the exit of the exhibition space, they reached the final interactive area. This area had a table with trays of objects from Jemez Historic Site and a digital microscope with an LED screen, which allowed visitors to get a closer look at different classes of artifacts. On the wall was a pegboard completely covered in small clipboards. This board was used for visitor and volunteer feedback about the project. They wrote comments relating their experiences and feelings, then clipped them to the wall. This is also where accolades for the excavation were posted, such as newspaper and magazine articles.

Throughout the exhibition there were tools and supplies on shelves, tables, and pegboards. All materials used for the excavation were interpreted with printed or hand-written cards secured to clipboards. Everything from toothbrushes (used for cleaning artifacts) to aluminum foil (used for collecting radiocarbon dating samples) were explained to the visitors.

Community Archaeology

Excavations involving community volunteers began on Thursday, August 16, 2018 (Figure 6). Since volunteers arrived at the project site with little to no prior training in archaeology, much of their first day was spent learning the basics and proceeding slowly with the excavation. Each day two to five NMHS staff members were present to assist with the volunteers. As established by the New Mexico Historic Preservation Division, the project's principal investigator or crew chief were always required to be on site when excavations were underway. As a result, volunteers were always supervised or within earshot of a knowledgeable staff member.

As the excavation progressed, staff developed an efficient daily and weekly schedule. Volunteers would arrive in the morning by 9:00 am. They would spend the first thirty minutes of the day moving the sifted dirt from the previous day's excavation to a designated on-site storage area (this dirt was used in various preservation projects at Jemez Historic Site). While the volunteers were moving dirt, staff would determine what activities needed to be completed from the previous day, or what new activities would be started. Staff would lay out and number grid units, as well as begin paperwork and other documentation on the upcoming day's activities. After that, volunteers would gather their tools from inside the Visitor Center and meet staff at the excavation to hear their assignments for the

Figure 6. First day of community excavation, photo by Justin Garoutte.

day. Staff realized that it took two to four volunteers in the artifact laboratory at any given time to keep up with the number of artifacts that were being recovered by the eight to ten volunteers excavating outside. Depending on their ability and skill level, some volunteers worked solely as laboratory workers or excavators, and a few would distribute their time between the two roles.

A midday meal break would be taken as a group when staff and volunteers would enjoy sack lunches under the shade of junipers near the entrance to the mission of San Jose. After lunch, volunteers would continue with their projects from the morning. No new activities would be started, and as individuals finished their tasks, they would help others attempt to complete their tasks before the end of the day. As a result, it was rare that a specific project had to be carried over into the next day. It was also the project goal that volunteers finish their specific task goals before the end of the work week, however, this would occasionally result in extending the working day schedule on Saturdays to wrap things up. In general, most days of excavation concluded between 2:00 pm and 3:00 pm.

Excavation Details

Daily project notes were taken by the principle investigator and crew chief documenting the details of the excavation project. The dig started within the outline of a roomblock that was believed to have been previously unexcavated. Three 1 x 1-m units were established within the roomblock to test the integrity of the mound. The grid was established in relation to cardinal directions and overlaid on the mound surface. The units were excavated using hand tools in 10-cm levels. Excavation of the first five levels in each unit revealed well-defined stratigraphy and it became clear that the roomblock was in fact undisturbed. The corner of a room was revealed in one of the units, and from this point on, the grid units selected for excavation were chosen in order to trace the stone walls of the room. All units were excavated to 1 m below the soil surface until the outline of the entire room was revealed (Figure 7). Once the entirety of the room was understood, excavations continued down until an ancient floor level was encountered. The floor was identified by an increase in the artifact count within the soil overlaying a distinct hard adobe surface.

Potential Conservation Threats of Community Archaeology

Community-based archaeology can be a fantastic way to build relationships and inspire advocates, but it can also present many conservation issues. One of the strongest critiques of community-based, participatory research is the assumed compromise of standards and academic validity by involving volunteers (Atalay 2012:156-157). The following section addresses conservation threats that can be mitigated by solid preventive conservation policy and procedures.

Community-based archaeology's goal is to allow stakeholders the opportunity to participate in all aspects of the archaeological process. As these types of programs grow in popularity and notability, the number of participants has grown as well. A low ratio of staff to volunteers (such as one staff member to every six volunteers) can create situations where volunteers participate in research projects without appropriate guidance from knowledgeable and experienced staff. The diverse knowledge and skillsets among the volunteers, usually not specific to archaeology or conservation, can also result in the poor or inappropriate handling of objects, resulting in breakage or dissociation of context information.

Public engagement with collected materials is encouraged in NMHS community archaeology programs at Coronado and Jemez Historic Sites since 2017. This puts the objects at risk of being dropped while untrained community members are handling them. Having recovered objects on clear view and allowing visitors to see everything that comes out of the ground (except for culturally sensitive materials) creates potential targets for

Figure 7. Drone image of the excavation showing the extent of the ancient pueblo room. Photo by Dan Monaghan.

theft or vandalism. Also, more hands processing and moving objects through the laboratory can create opportunities for objects to become separated from their documentation resulting in dissociation.

Preventive Conservation-Minded Object Processing

During this community excavation project, thousands of artifacts were recovered, almost all of which were processed by volunteers. Each step of the object handling process was also visible to the public. As a result, a visitor could follow a specific object from its exhumation, documentation, through the field laboratory, and see it prepared for long-term curation and analysis. This accessibility and transparency of the archaeological project was a unique and eye-opening experience for visitors and participants alike. Each object was evaluated individually by staff and cultural stakeholders. Most objects that were uncovered during the excavation were prepared for long-term curation at the Center for New Mexico Archaeology located in Santa Fe. Others were selected for use in the core exhibition planned for the Jemez Historic Site visitor center. A small number were identified by tribal representatives to be used within the living pueblo of Walatowa or to be reburied in a predesignated location on the site (as determined by formal consultation and stipulated in the data recovery plan).

To comply with responsible and respectful object handling, it is essential to have a planned flow of artifacts from recovery in the field to processing in the laboratory (Figure 8). Anticipating

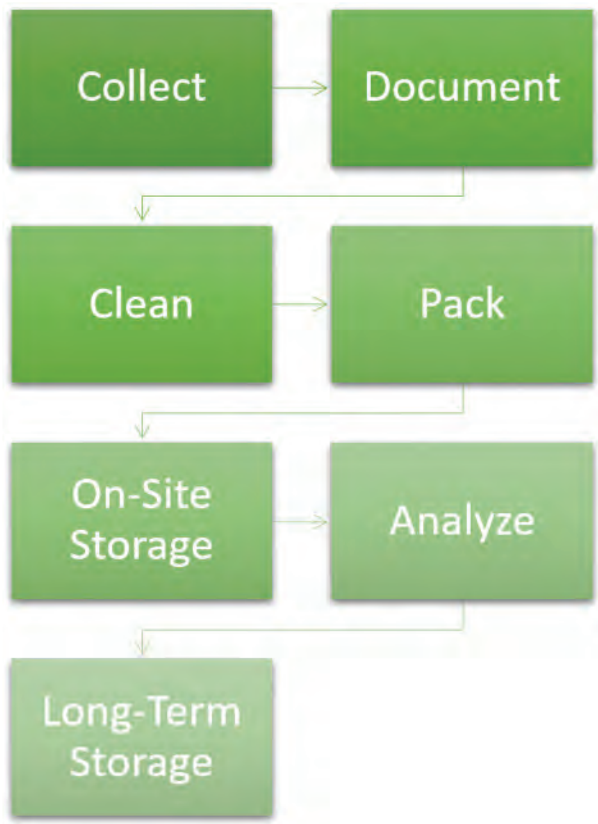

Figure 8. Flow of objects from field to curation.

where objects should be at every step of the process facilitates a unidirectional flow of artifacts and reduces the chances of disassociation, so long as all the proper steps are followed.

When objects are first exposed to surface conditions, they immediately go through the process of acclimating to a new environment. This is a critical time for the objects in terms of handling. When objects were unearthed or identified, but before they were removed from their context, they were assessed for stability by a staff member. Stable objects were identified as having the ability to support their own weight and not be prone to physical breakage. Unstable artifacts were noted by their visibly active deterioration. Fragile objects were classified as being small or delicate in nature and potentially prone to physical breakage. For the sake of simplicity in this project, all fragile objects were treated as if they were unstable objects. These classifications determined how each object was handled as it left the archaeological matrix and was prepped for long-term curation at Center for New Mexico Archaeology.

Documentation of the artifacts was crucial during the excavation process and was accomplished by both staff and volunteers. This documentation ties the archaeological context to the object and helps to create an inventory of all items recovered from the dig. The documents will be deposited at the Archaeological Records Management Section at the Laboratory of Anthropology in Santa Fe in perpetuity for future research on the collections and site.

When excavating units by level, a field form was used as the most basic documentation of objects and archaeological disturbance of the site. The Field Specimen Log served two purposes in documentation. It was a separate back-up of recorded information and was used to help correct mistakes that were made in transcribing label information during laboratory processing. It also served as a master inventory list of the objects that were removed from the site. This was very important for a community archaeology program in which many different people were handling and moving objects.

Paper field bags were used to collect the objects as soon as they were removed from the ground. These bags were also used to transport the objects from the field to the laboratory. Objects remained in the paper field bags for up to seven days as the objects inside dried and acclimated to terrestrial conditions. At minimum, the bags were required to have the site number/name, date, unit number, level number, beginning and ending depth, list of material contents, and field specimen number. During the laboratory processing of artifacts, each object or bulk group was given a catalog card. This card had the same information that was recorded on the field bags, field forms, and field specimen log. The object card is the label that will live with the items for the rest of their time in collections and research. The object cards were printed on acid-free archival cardstock with laser-jet printer or toner copy machine.

After the objects were documented in the laboratory, the cleaning step was evaluated. Cleaning the objects is required by the Center for New Mexico Archaeology before the items are transferred into long-term curation. The level of cleaning is not stipulated, however. Each object was evaluated based on its condition and material type to determine the degree to which it was cleaned. Unstable bone, metal, chipped stone tools, charcoal, and organic materials were not cleaned in any way to preserve their integrity for future research as well as mitigate potential damage to the objects. Stable bone, stable metal, unstable ceramics, and ground stone were all cleaned lightly with a dry brush. Stable ceramics and chipped stone debitage were all cleaned with water and a wet brush (Figure 9). After cleaning, all objects were allowed to acclimate to terrestrial conditions for a minimum of six days. Once objects had gone through all of the procedural steps in the artifact laboratory, they were separated by material class and packaged in archival zip-top bags. By the end of this project over 20,000 objects had been recovered from the room and processed.

Impact

The impacts of this project have been measured in several ways by multiple organizations. Below the various metrics, both quantitative and qualitative, are discussed.

Figure 9. A volunteer, Marie Lobo, guides a young visitor as she washes recently excavated pottery in the *Aritifact Lab* exhibit.

New Mexico Historic Sites' Metrics

Jemez Historic Site records several metrics as determined by the New Mexico Department of Cultural Affairs and New Mexico State Legislature. During this project, Jemez saw a 22% increase in visitation for the months of August, September, and October 2018, compared to the average of the three previous years (2015-2017). While there was an increase in visitation, there was almost no increase in revenue for the site (1 percent compared to the previous three-year average). This suggests that the increase in visitors occurred during free community events such as the New Mexico Historic Preservation Archaeology Fair in October of 2018. Overall, according to the numbers reported to the New Mexico State Legislature, 5,805 visitors experienced the community archaeology project (NMHS 2018).

The most noticeable increase during the project at Jemez was the reported volunteer hours for the site. During the 2018 project, the volunteer hours increased by 2,232 percent compared to the previous three-year average. This substantial increase will allow Jemez Historic Site to be more competitive for federal grants and other private funding in the future. In addition to the in-person interactions, NMHS's social media team recorded over 60,000 interactions connected to posts about the community excavation.

Friends of Coronado and Jemez Metrics

A requirement of participation in the project was that volunteers (excluding tribal members and students) be members of the Friends of Coronado and Jemez. The membership application does not have a place to denote if people were joining solely to participate in the dig, so it is unclear how many new members the organization gained as a direct result of the project. Personal communication with the Membership Chair on the Board of Directors revealed that there was a general increase in membership in 2018, resulting in just under 500 members after the completion of the community project. The membership chair also acknowledged that 79 members of the group participated in the community excavation, suggesting that a minimum of $2,756 was generated in membership revenue by participants (Beth Main, personal communication 2019).

Pre- and Post-Survey Results

Before volunteers arrived at Jemez for their first day of the project, they were encouraged to complete an online survey created by the author through Google Forms. This survey featured nine questions intended to better understand the perspectives of the participants. These questions explored the volunteer's prior experiences with archaeology, and over half (52.9 percent) had never seen or participated in excavation of an archaeological site. Another question asked volunteers to self-evaluate their knowledge of Jemez Historic Site on a scale of 1 to 10 (1 being "beginner" and 10 being "expert"). This question was repeated in a post-project survey to gauge if volunteers perceived a change in their understanding of the history and culture of the historic site. In the pre-project survey over half (67.6 percent) of the visitors ranked themselves at or below midpoint of knowledge level, while in the post-project survey all participants (100 percent) rated themselves at or above the midpoint.

Both surveys featured four repeating questions focusing on archaeological epistemology. One goal of this project was to improve the community's perception and understanding of the archaeological process. Thus, these four questions were designed to start volunteers thinking about epistemology, as well as place them within Hein's diagram of learning and knowledge theory.

The most noticeable change documented after the project was completed was that volunteers' overall perception of how archaeologists "know" things changed. Volunteers shifted from thinking archaeologists gathered knowledge externally based on what they found to understanding that each archaeologist created his/her own unique knowledge based on individual experiences. This shifted the volunteers' understanding of knowledge theory in an archaeological setting. When volunteers began, they leaned towards the idea that knowledge exists outside of the learner and that archaeologists are looking for the missing pieces of a completable story. After experiencing the community archaeology program, the majority of volunteers understood that different archaeologists could excavate the same sites and come up with different stories. Less change was seen in the theory of learning scale, when surveyed volunteers clustered in the realm that knowledge is incremental. While volunteers' perception of archaeology shifted after their experience in community archaeology, there is still work to be done for future projects. In the post-project survey, volunteers were also asked if they would be willing to participate in a similar project again. Ninety-five percent of the participants answered "yes" or "maybe" to that question, demonstrating that it was an enjoyable and stimulating project.

Volunteer Experiences

On a volunteer's last day of participation in the project, they were given the opportunity to write about their experiences on a clipboard and hang it on a pegboard in the exhibition. Forty-six volunteers chose to share their perspectives with the public. These notes were insightful as to the aspects of the project that resonated with volunteers. Three common themes were identified after transcribing and coding the volunteer experience narratives. Forty-eight percent of the participants specifically mentioned that they learned something during the project, or that their understanding of history or archaeology was altered. Below is a selection of volunteer experience narratives that highlight the educational aspects of the project:

> "I learned so much that can't be learned from books." - Elise Rodriquez

> "It's never "just another" historic site… but we could not suspect the journey ahead from stopping here. The view from the inside, of a world we have been curious about for years, was enriching, eye opening, inspiring… Many thanks to Ethan. What a way to begin discovering new ideas!!" – Serge

> "Totally awesome! I learned so much in 3 days I can't believe it. Very nice people – so much fun to hang out with them. Also great to get a sense even if it is a small sense of how these ancient people lived. Wonderful!" – Anonymous

Forty-six percent of the participants specifically mentioned that they enjoyed the community aspect of the project, whether it was based on interactions with visitors, staff, or other volunteers. Below are a few examples of these volunteer experience narratives:

> "The best part of Dig Giusewa for me was getting to know about the Jemez Natives who staff the site. They are gentle, informative people and welcoming to this white person. To quote Brenda 'We are all just people'." - Ginger Forester

> "It was an honor and a privilege to work at Jemez Historic Site on this excavation. I enjoyed talking with the public – particularly the children – about what we are doing." – Marie Lobo

> "Thank you for the opportunity to learn and connect with Jemez History. It was fun to be able to visit with everyone who came by to see the dig and the whole

> site and share what we were involved in. I look forward to joining the team next year." – Linda McDowell

Forty-three percent of the volunteers mentioned artifacts or objects recovered during the excavation. It is no surprise that this was a common theme, since artifacts were the subject of the project's "Big Idea." The movement of the artifacts through the project laboratory and exhibition was a key educational mechanism to illustrate the archaeological process. Below are a few examples from participants that were inspired by the artifacts that they interacted with:

> "I had a great time excavating here! I was looking for some field experience and I found that here. I got to uncover my first artifacts, which is really exciting. To realize you're the first person to see a particular object which has been buried for hundreds of years is kind of mind blowing. To be the first person to touch an artifact since the person who deposited it here is surreal. I loved it." – Evan

> "Fabulous experience!! My most exciting find was a Rio Grande Glazeware sherd which indicates trade. As I dug, I kept thinking about the people who lived at Giusewa." – Deborah Ellis

These comments were not only useful in evaluating the project—they also added to the dynamic nature of the exhibition. Each week new volunteers would add their stories and experiences to the board, which quickly became a favorite area of the installation for visitors. People would congregate around the board pointing to the comments that they thought were funny or discussing which one was their favorite. These narratives from the participants also inspired some visitors to become members of the Friends organization so that they could participate in future community archaeology projects.

Conclusion

This project was a fascinating expedition not only in Southwestern archaeology, but also in volunteer coordination and community engagement. There are clear benefits to conducting community archaeology that is hallmarked by the enhancement of relationships with cultural stakeholders. NMHS plans to continue the Community Archaeology Program and similar visitor experiences such as the *Artifact Laboratory* exhibition. This program has not only increased visitation and enhanced visitors' understanding of archaeology and local history, but it has crated long-term volunteers and advocates for archaeology and preservation. A future goal is to further develop the training for volunteers throughout the project and continue to create print resources such as object handling manuals to assist future staff and volunteers to conduct similar projects at diverse historic sites throughout the state. Community archaeology and a transparent object handling process can be used as a dynamic interpretation tools to increase public engagement, generate trust, and build relationships with community stakeholders.

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Revisiting the Hopi Area Connection at Pottery Mound, New Mexico

DAVID A. PHILLIPS, JR., HAYWARD H. FRANKLIN, SUZANNE L. ECKERT, AND JEAN H. BALLAGH

In the early 1300s, potters in northeast Arizona began making distinctive yellow ware vessels fired with coal. Occasional sherds of painted and unpainted yellow wares from that region have been found across the U.S. Southwest. In most late prehispanic villages of the Rio Grande region, such sherds are rare—less than 0.004 percent of the total ceramic assemblage. At Pottery Mound, west of Los Lunas, such sherds are less rare—about 0.6 percent of the total (Figure 1). In other words, yellow ware sherds traceable to the Hopi area are 150 times more common at Pottery Mound than at other Rio Grande pueblos. Translating these percentages into human behavior, almost every Hopi area yellow ware vessel that reached the Classic period Rio Grande world was used and discarded at just one village—Pottery Mound—of the scores then occupied in north-central New Mexico. In the 2020 ASNM annual volume honoring Michael Marshall, we noted the "very odd" distribution of Hopi area yellow ware sherds in the Rio Grande region (Phillips et al. 2020). In this essay we take the next step and attempt to explain the unique ceramic connection between Pottery Mound's residents and those of northeast Arizona.

Pottery Mound as an Archaeological Site

Perched next to the Rio Puerco west of Los Lunas, New Mexico, Pottery Mound includes several hundred adobe rooms. The site was first brought to archaeologists' attention by a geologist, Thor Warner (1928). Frank Hibben (1955, 1966, 1975) excavated repeatedly in the site, primarily between 1954 and 1961 but occasionally until 1977 (see also Ballagh 2011, 2020; Ballagh and Phillips 2006, 2008). In particular, Hibben's east-west bulldozer trench, cut in 1961, exposed two major occupation levels dominated by Rio Grande and Western Pueblo glaze wares (Schaafsma 2007). Although Hibben described the site as having been three to four stories tall, Linda Cordell's 1979 fieldwork at the site (Cordell 1980) found evidence of only a single story (personal communication to Eckert, 2001). Michael Marshall (personal communication to Franklin and Phillips, 2018) has found a layer with Socorro Black-on-white pottery beneath the main occupation, now exposed by the Rio Puerco of the East, indicating a small earlier occupation.

Absolute dates are few (Eckert 2008; Franklin 2008, 2018), but given those dates and ceramic cross-dating, the site's period of florescence fell between 1325 and 1475. By 1500 most of the village was unoccupied, but a remnant population continued in the "Annex," a small outlying area about 120 m northeast of the main site, until about 1550. The Annex assemblage lacks the abundant Hopi area yellow ware imports that characterized the main occupation of the site (Franklin 2018)—indicating that during Pottery Mound's final years, its residents' connection with northeast Arizona had ended, or at least changed.

Hibben's field approach was not conducive to reconstructing the village plan. The layout used here was suggested by Phillips and Ballagh (2010; see also Adler 2007; Crotty 2007; Schuyler et al. 2013) but is

Figure 1. Hopi area pottery found at Pottery Mound. Top: Jeddito Yellow Ware. Bottom: Awatovi Yellow Ware. Photos by Hayward Franklin.

not the only possible layout (see Eckert 2008:Figures 3.3 and 3.4). By the second of two major glaze ware period occupations, the site consisted of continuous or almost-continuous room blocks separating two plazas, which were open to the east and west (Figure 2). This large central room block may have started as multiple smaller blocks of rooms that were connected through additional construction. Earlier Classic period rooms were present beneath this room block; outlying room blocks may also represent early construction. Such reorganizations of villages from collections of room blocks to more formal and continuous layouts happened repeatedly in the late Ancestral Puebloan world.

Multiple kivas were present in the two plazas and elsewhere but were not all used at once, as some were found under rooms. Rio Grande style (east-oriented) kivas cluster in the east half of the site, while Western Pueblo style (south-oriented) kivas cluster in the west half (Adler 2007:Figure 3.3; Crotty 2007:Table 6.1). Substantial middens are present south, west, and north of the room blocks.

The goal of this essay is to better understand the people who lived in the village we have just described. Specifically, were immigrants from northeast Arizona ever part of the village? If so, how did they integrate themselves with (or segregate themselves from) the other residents?

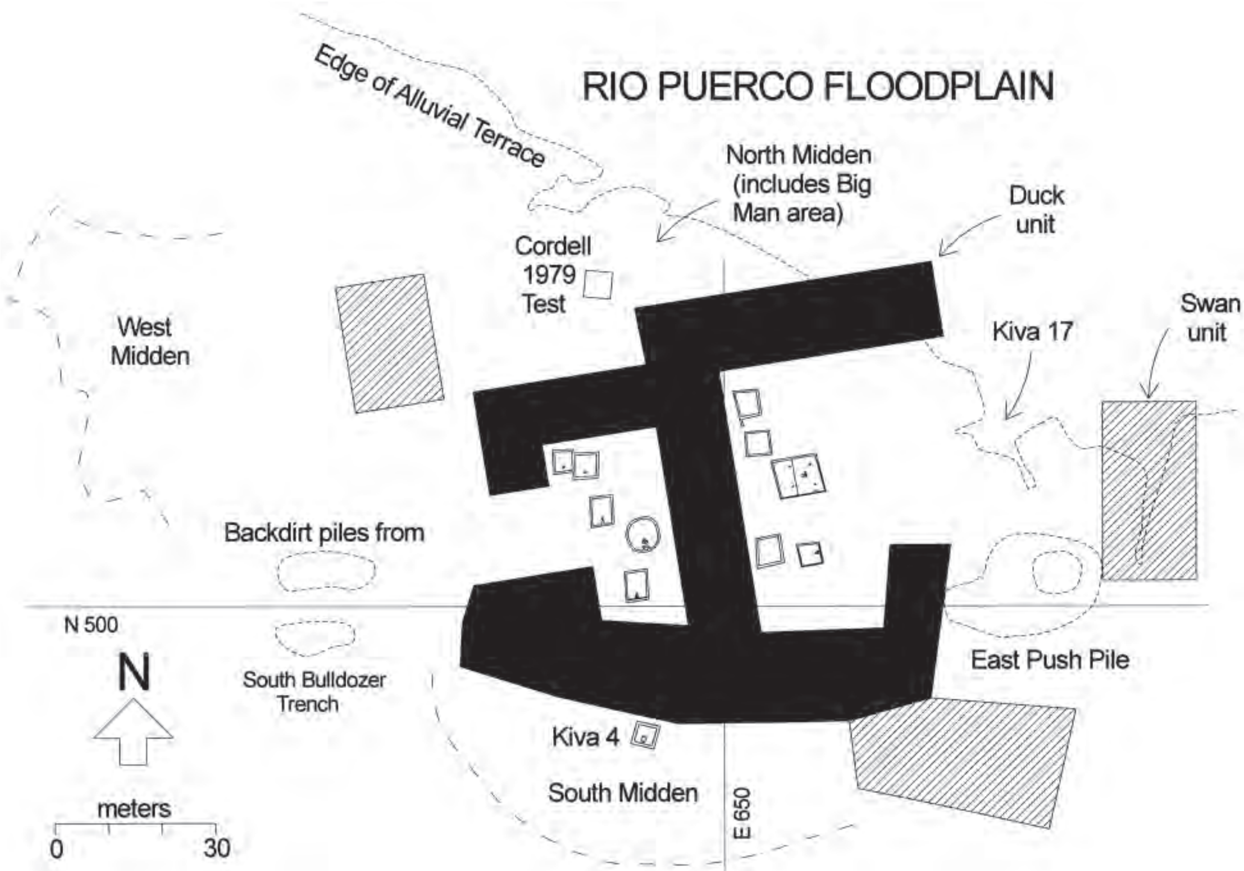

Figure 2. One possible reconstruction of Pottery Mound. The main series of room blocks, late in the site's history, is indicated in black. Earlier rooms were found beneath the main room block; outlying areas of rooms (hachured) may also be early. The spatial extent of the rooms may be greater than shown, especially in the little-studied west end of the site. Most known kivas were in two plazas; Kiva 4 is south of the proposed late series of room blocks, Kiva 17 (lost to erosion) was east of those room blocks, and three kivas lie below the late rooms. Modified from Phillips and Ballagh (2010:Figure 6).

Previous Studies of Immigration from Northeast Arizona

As Phillips and his colleagues (2020) describe, Frank Hibben toyed with the idea that Pottery Mound housed immigrants from what is now the Hopi area. Within a few years of his speculations, however, migration fell out of archaeological favor (see Adams et al. 1978). Fortunately for this essay, discussions of migration are once again commonplace (e.g., Cameron 1996; Duff 2002; Herr and Clark 1997; Lyons 2003; Ortman 2012; Spielmann 1998). The first systematic evaluation of migration at Pottery Mound, by Suzanne Eckert (2003, 2006, 2007, 2008), also examined a second Pueblo IV period village along the Rio Puerco, Hummingbird Ruin. Based on her studies of ceramic technology and design styles, Eckert concluded that immigrants from the Acoma-Zuni area (probably from Zuni) resided at both villages, and that immigrants from the Hopi area resided at Pottery Mound (Eckert 2008:50–53). Both sets of immigrants arrived after the villages were founded, were always a small minority, and possibly lived in spatially segregated areas within the villages (Eckert 2003:153, 162; 2007:60–66; 2008:57).

Eckert's studies serve to trace how the two Pueblo IV villages experienced "the tensions of segregation and incorporation that are a core aspect of Pueblo social dynamics" (Eckert 2007:56). She argued that immigrants' pottery reflected their origins and the identities they maintained within the village. Certain technological practices represented the carrying over of ingrained habits from immigrants' homelands (Eckert 2003:79–81, 2007:61–63). Design choices were more nuanced, representing a combination of designs from both pre- and post-immigration contexts. Pottery Mound Polychrome bowl exteriors are identical to those of Rio Grande Glaze Ware bowls, for example, but have Hopi area designs on their interiors. Eckert interpreted this pattern as an attempt to project public messages of social unity, through the more visible bowl exteriors, while alluding to the immigrants' place of origin through the more private bowl interiors (Eckert 2003:89, 2008:77–78).

In 2013, Patrick Lyons questioned Eckert's arguments for Hopi area immigrants at Pottery Mound. He argued that the Hopi area yellow ware at Pottery Mound could be due to factors other than migration, questioned the Hopi area origin of the Sikyatki design style, proposed that Pottery Mound Polychrome is more likely to have been produced by immigrants from Zuni, and suggested a Zuni derivation for the Western Pueblo style kivas at the site (Lyons 2013). Lyons' arguments may have been conditioned by his having found strong evidence for migration from the Hopi area to east-central Arizona, without finding much yellow ware in the latter area (Lyons 2003).

Most recently, O'Donnell et al. (2020) compared dental morphology at Pottery Mound with that of other regional populations. Based on that non-destructive metric, Pottery Mound's population more closely resembled Middle Rio Grande populations than a Western Puebloan comparative population, "suggesting little or no gene flow" between Pottery Mound and the west (O'Donnell et al. 2020:508). This valuable new study does involve two limitations. First, it treated Pottery Mound's population as a unit, despite known diversity in religious architecture (Adler 2007; Crotty 2007), jewelry (Schuyler 2016), and the dental population itself (O'Donnell et al. 2020:508). Second, the study's Western Puebloan comparative population came from Hawaikku, an ancestral Zuni site. The modern Zuni and Hopi speak unrelated languages, indicating divisions stretching far back in time, so we doubt that ancestral sites in one of those two areas are an adequate proxy (see O'Donnell 2020:508) for the other. We hope that O'Donnell and her colleagues will extend their research to include internal dental variation at Pottery Mound and, if possible, a comparative population more directly related to the Hopi area.

The Current Study

Meanwhile, we again turn to ceramic evidence, heeding Lyons' warning that "The presence of Jeddito Yellow Ware...in and of itself, does not constitute evidence of migration; although, migration may have been the circulation mechanism responsible" (Lyons 2013:168). Using data obtained since Eckert's and Lyons' research, we argue that Eckert was correct to propose migration as one of the processes (including ceramic exchange) connecting the Hopi area and Pottery Mound.

First, however, it is necessary to discuss what we mean by "Hopi area yellow ware" and our assumptions about who was making it. After 1300, potters in northeast Arizona began making distinctive unslipped, often untempered yellow wares. In this essay, we describe these wares as painted and unpainted Hopi area yellow wares. It is far too common to gloss such pottery as "Hopi" rather than as "Hopi area." At the time Pottery Mound was occupied, Hopi identity was still taking shape (Hays-Gilpin et al. 2019). Even if some residents at Pottery Mound came from the Hopi area of northeast Arizona, it would be an anachronism to refer to them as Hopi. Like Lyons, we do not take the presence of Hopi area yellow wares to be proof of migrants from the Hopi area.

Past archaeological use of the term "migration" often implied unidirectional movement, from the area where certain traits first appeared to the area where those traits later appeared. Instead, we visualize an ongoing process in which long-distance connections led to or were created by migration—which might flow in either or both directions and which might involve return migration. Moreover, such connections most likely involved not just people but their ideas and goods (including ritual goods), which operated inseparably even if it is sometimes useful to separate them for analysis (see Hays-Gilpin et al. 2019).

Evaluating the Hopi Area Yellow Ware at Pottery Mound

Based on analysis of various Pottery Mound ceramic assemblages (Eckert 2003, 2008; Franklin 2007, 2010, 2014; Voll 1961), there is no doubt that ceramic vessels habitually flowed to Pottery Mound from contemporary pueblos in the Western Pueblo region (see Phillips et al. 2020:Table 1). At Pottery Mound, most of the sherds from that region can be traced back to what are now the Acoma and Zuni areas, but painted and unpainted yellow ware sherds from northeast Arizona (the Hopi area) were also found. All of the Western Pueblo pottery types recovered have production dates falling between Pottery Mound's establishment (ca. 1300) and the end of its period of florescence (ca. 1475). Eckert's and Franklin's pottery analysis of materials from Cordell's 1979 test in the North Midden, along with Voll's results from Hibben's excavations, make it clear that imports of Western Pueblo pottery occurred over most of the site's occupation history. Acoma-Zuni pottery is present in the midden's basal levels, and Hopi area sherds become increasingly frequent at lower (i.e., earlier) levels (Franklin 2007:Table 7).

There are at least three potential explanations for the Hopi area yellow ware at Pottery Mound: (a) down-the-line exchange of commodities; (b) the sharing of ritual information and accessories between residents of Pottery Mound and of the Hopi area, which minimally involved face-to-face contact between ritual specialists; and (c) immigrants from the Hopi area who resided, at least briefly, at Pottery Mound. These explanations are not mutually exclusive and, as we shall show, combining them (as opposed to choosing one over the others) provides the clearest picture currently available of the connection between Pottery Mound and northeast Arizona.

Down-the-Line Exchange?

In down-the-line exchange, recipients of goods keep some for themselves and pass on the rest to a different group, which then does the same. Because the volume of exchanged material decreases with every interaction, down-the-line exchange results in an exponential decay in the frequency of goods as distance from the source increases. In our case, villages closer to northeast Arizona should have more Hopi area yellow ware pottery than villages farther away. (While we focus on pottery in this essay, vessels could also have doubled as containers for goods, such as salt, that have not survived.)

Down-the-line exchange from northeast Arizona to Pottery Mound could have followed one or both of two major routes (Ferguson and Hart 1985). The southern route involved going south (up the Little Colorado River), then east to cross the Continental Divide near the Plains of San Agustín. From there the route utilized the pass between the Gallinas and Magdalena Mountains to reach the Rio Abajo, then followed the Rio Grande and Rio Puerco of the East northward to Pottery Mound. Duff (2002) reports sites in the Upper Little Colorado River area with from 0.1 to 19.1 percent Hopi area yellow ware, sites in the Rio Puerco of the West area with from 4.2 to 6.4 percent, and one site in the Silver Creek area (the Bailey Ruin) with 27.7 percent. However, Eckert's research on Magdalena area Pueblo IV sites has identified no Hopi area yellow wares on any of those sites, based on in-person visits and site form reviews. Also, such sherds are present but extremely rare at Rio Abajo sites (Phillips et al. 2020; CyberSW database, https://cybersw.org/). Given the sparseness of Hopi area yellow wares east of the Datil Mountains and in the adjacent Rio Abajo, any down-the-line trade of Hopi area yellow wares to Pottery Mound did not take the southern route.

The northern route is a different story. A 2020 search of the CyberSW database, by Gregson Schachner for Eckert, found nine Pueblo IV sites in the Zuni area at which Hopi yellow wares comprise 0.27 to 9.76 percent of the ceramic assemblage. Once past the Zuni area, this route struck out for the pass between Mt. Taylor and Cebollita Mesa (at the north end of El Malpais), crossing through the Acoma or Laguna areas, and turning south at the Rio Puerco of the East to arrive at Pottery Mound. Gregson Schachner (personal communication to Eckert, 2020) reports Hopi area yellow wares at the Citadel and Rattail sites in the Cebollita Mesa area east of El Malpais. David Hill (personal communication to Eckert, 2020) reports that surface collections from many of the 150 Pueblo IV Acoma area sites that he has visited have up to 5 percent Hopi area yellow ware sherds on the surface.

As one moves east, however, arguments for down-the-line exchange become trickier. Phillips' examination of Florence Hawley Ellis's sherd collections from the Laguna area, now at the Maxwell Museum, found little or no Hopi area pottery. Also, Eckert (2008) reported no Hopi area yellow ware at Hummingbird Ruin, which is roughly on the line of travel between the Laguna area and the northern Rio Abajo. The general scarcity of Hopi area yellow ware in the Rio Grande region (Phillips et al. 2020) indicates that if such pottery reached Pottery Mound via down-the-line exchange, almost none of it went any farther east, despite the short distances and easy terrain involved. In turn, this pattern suggests a social impediment to further down-the-line spread of Hopi area pottery. Nonetheless, if summary sherd percentages from sites were the entire dataset, we might argue that down-the-line exchange adequately explains the observed patterns as far east as Pottery Mound. It is other evidence that leads us to suggest that the presence of Hopi area pottery at Pottery Mound should not be explained solely by invoking that model.

Adding Ritual Sharing?

Next, we consider whether the unusual amount of Hopi area yellow ware at Pottery Mound is better explained by adding the concept of "ritual sharing" (see Hays-Gilpin and LeBlanc 2007). In this essay, we assume that ritual sharing involves the exchange of ritual beliefs and practices through face-to-face interaction among disparate groups. Several investigators have noted the Sikyatki style content in kiva murals at Pottery Mound (Brody 1964; Crotty 1995, 2007; Hibben 1975). And, as we have mentioned, Pottery Mound Polychrome sometimes displays Sikyatki style painted designs on bowl interiors (Eckert 2003, 2008; Franklin 2007, 2010). The Sikyatki artistic style was first defined from murals and pottery in the Hopi area (e.g., Smith 1952, 1971) so was thought to originate there, but who originated the style and who adopted it is not critical to this essay. What matters is that the transfer of ritual painting practices and subject matter over such a distance has behavioral implications (Hays-Gilpin and LeBlanc 2007).

We therefore considered whether Pottery Mound was a place where, in religious terms, East and West did meet (see Hays-Gilpin et al. 2019). Given the Sikyatki designs on kiva murals and local pottery at Pottery Mound, it is not difficult to envision a Sikyatki "ritual package" that included the use of Hopi area yellow ware vessels.[1] If, for example, Hopi area Sikyatki acolytes traveled to Pottery Mound as the birthplace of Sikyatki, they might well bring pottery as offerings. Or perhaps Pottery Mound's residents happily traded other items for such pots, given their acceptance of a Sikyatki package derived from northeast Arizona. (Meanwhile, such pots were not needed, or were even snubbed, by local pueblos that had not bought into the package.) In any case, it is easy to propose religious motivations for the use of painted yellow ware pottery at Pottery Mound. Admittedly, not all Hopi area painted pottery bore Sikyatki designs, but it is an argument worth considering.

Our reason for questioning the sufficiency of this explanation is the presence of utility ware from northeast Arizona. Of the 239 Hopi area sherds identified from Cordell's North Midden test by Franklin, 222 are from decorated vessels, but 17 are from plain or corrugated utility vessels.[2] Moreover, utility sherds make up 73 of the 142 Hopi area sherds from the South Midden collection and two out of the 15 Hopi area sherds from the West Midden collection, as well as one of the three Hopi area sherds from the general surface collection (Franklin 2014; Phillips et al. 2020:Table 2). Sikyatki ritual practice at Pottery Mound might justify moving a painted pot 350 km (as the raven flies), but why carry a utility pot that same distance? If we answer that Hopi area utility vessels as well as painted ones were part of a Sikyatki ritual package at Pottery Mound, we must propose a compelling justification for importing "everyday" pottery from such a distant source. And given the proposed east and west halves of the site, including differences in kivas, we note that Sikyatki style kiva murals occur in both "east half" (east-facing) and "west half" (south-facing) kivas (Crotty 2007). Based on this fact, Hopi area imports as part of a ritual "Sikyatki package" should have been used across the site.

Our reason for rejecting this modified explanation grew from an impression gained, like Hibben's, by walking about the site: painted sherds from the Hopi area were distributed fairly evenly over the site surface, but Hopi area utility sherds seemed to be more common in the southwest part of the site. To investigate this possibility, a field crew used random walks to locate, point-provenience, and collect 533 Hopi area sherds from the site surface (Phillips et al. 2020:Figure 1). These sherds came from both decorated vessels (Jeddito Yellow Ware; n = 401) and utility vessels (Awatovi Yellow Ware; n = 132).

Table 1 indicates that the raw counts for point-provenienced Hopi area sherds peak between N 475 and 500 and between E 600 and 625. We cannot interpret this trend without knowing something

Table 1. Chart of the spatial distribution of Hopi area sherds. Format: Utility/Total. This sample consists of the sherds that were point-provenienced and surface collected; none of the collection points coincided with the 1 by 1-m units collected by Franklin. Percentages are given for cells with 10 or more sherds. Gray cells indicate grid squares entirely outside the site.

Northing	**Easting**									
	500–525	525–550	550–575	575–600	600–625	625–650	650–675	675–700	700–725	*Total*
575–600				2/5	0/2					*2/7*
550–575	0/1	1/8	3/17 18%	5/20 25%	8/34 24%	2/7				*19/87 22%*
525–550	1/2	2/13 15%	2/32 6%	0/7	4/16 25%	1/9	2/34 6%	0/7		*12/120 10%*
500–525	1/1	2/6	11/30 37%	1/8	3/20 15%	5/14 36%	4/18 22%	0/5		*27/102 26%*
475–500			5/6	27/37 73%	12/35 34%	8/24 33%	8/19 42%	3/18 17%	0/1	*63/140 45%*
450–475			0/1	2/7	2/16 13%	5/16 31%	0/3	0/15 0%	0/14 0%	*9/72 13%*
425–450					0/1	0/2	0/2			*0/5*
Total	*2/4*	*5/27 19%*	*21/86 24%*	*37/84 44%*	*29/124 23%*	*21/72 29%*	*14/76 18%*	*3/45 7%*	*0/15 0%*	*132/533 25%*

about the surface distribution of sherds in general. To that end, we used the E 650 line (along the central spine of the suspected large room block) and the N 500 line (along Hibben's South Bulldozer Trench) to define four quadrants of unequal size (northwest, 13,768 m^2; southwest, 4,551 m^2; northeast, 4,106 m^2; southeast, 5,069 m^2; total, 27,494 m^2). Based on Franklin's (2014) 1 by 1-m collection units, we estimated the proportions of surface sherds of all types in each of the site quadrants (Table 2) and compared those estimates to the proportions for the point-provenienced Hopi area sherds.

As Table 2 indicates, collected Hopi area sherds were about as common in the northwest and southeast quadrants of the site, relatively speaking, as sherds in general. However, Hopi area sherds were much more common in the southwest quadrant, and much less common in the northeast quadrant, relative to sherds in general. If we use the all-sherd estimate to generate expected values for the Hopi area sherds by quadrants, a Chi-square test indicates that the divergence between expected and observed frequencies of Hopi area sherds, by quadrant, is significant at the 0.001 level.

We hesitated to rely solely on this result, given issues including the large variance in sherd counts for the 1 by 1-m surface collection units and the less than perfectly random walks used to collect Hopi area surface sherds. (If Hopi area sherds were evenly distributed over the site, the Table 2 values for such sherds could have been obtained by unconsciously focusing more effort in the site's southwest quadrant and less in its northeast quadrant.) Instead, we regarded Table 2 as a preliminary look at the data and used a different approach to provide numbers that seem more informative as well as more reliable. Besides showing the number of Hopi area sherds per 25 by 25-m grid square, Table 1 indicates the number of Hopi area utility sherds in each grid square. As with Hopi area sherds in general, the north-south distribution of Hopi area utility sherds peaks between N 475 and 500. The east-west distribution

Table 2. Sherd estimates and counts by quadrant.

Quadrant	Estimated Distribution of Surface Sherds*	Point-Provenienced Hopi Area Sherds	
		Percent	Count
NW	43.4%	47.3%	252
SW	16.5%	27.2%	145
NE	25.0%	12.0%	64
SE	15.1%	13.5%	72
Total	*100.0%*	*100.0%*	*533*

(*Based on Franklin systematic collection)

of such sherds is slightly different, peaking between E 575 and 600. Table 3 shows the distribution of Hopi area utility sherds versus decorated sherds, by site quadrant.

Let us assume, for the sake of argument, that Hopi area sherds are fairly evenly distributed relative to sherds in general, so that the results in Table 2 indicate sampling bias as well as an unequal distribution of surface sherds in general. As percentages (Table 3), the Hopi area utility sherds are about as common as Hopi area decorated sherds in the northwest and southeast quadrants, are more than twice as common as Hopi area decorated sherds in the southwest quadrant, and are about one-third as common as Hopi area decorated sherds in the northeast quadrant. Using the proportions of painted sherds by quadrant to assign expected

Table 3. Counts and percentages of Hopi area sherds by quadrant.

Quadrant	Utility Sherds (Awatovi)	Decorated Sherds (Jeddito)	Total
NW	54 40.9%	198 49.4%	*252* *47.3%*
SW	61 46.2%	84 20.9%	*145* *27.7%*
NE	6 4.5%	58 14.5%	*64* *12.0%*
SE	11 8.8%	61 15.2%	*72* *13.5%*
Total	*132* *100.0%*	*401* *100.0%*	*533* *100.0%*

frequencies to the utility sherds, a Chi-square test indicates that the differences between expected and observed frequencies of utility sherds, by quadrant, are significant at the 0.001 level. The relative concentration of Hopi area utility sherds in the southwest quadrant of the site, even when controlling for possible sampling bias, leads us to suspect that the similar trend in Hopi area decorated sherds is not an artifact of our methodology.

The pattern of Hopi area utility sherds being distributed differently than Hopi area painted sherds can be seen in a second data set, the collection of which did not involve use of a potentially biased random walk. This data set involves the 54,542 sherds collected from the north, west, and south middens (Table 4). In each case, the collections are systematic samples of all sherds from each sample unit. Hopi area sherds are proportionally more common on the South Midden than in the excavated North Midden or on the West Midden. More to the point, utility sherds make up about half of the Hopi area sherds from the South Midden sample, but less than one-tenth of the Hopi area sherds from the combined North and West Midden samples. A Chi-square test of the observed frequencies of Hopi area painted versus utility sherds, in the South versus North and West Middens, is significant at the 0.01 level. Thus, the skewed spatial distribution of Hopi area utility sherds versus Hopi area painted sherds is not confined to the point-provenienced surface collection.

In summary, a mix of undirected (down-the-line) exchange and directed exchange (prompted by ritual sharing) appears to better account for the observed pattern than down-the-line trade alone. Specifically, we might argue that down-the-line exchange accounts for the common occurrence of Hopi area sherds in the Western Pueblo area, while directed exchange prompted by ritual sharing accounts for the unusual concentration of such sherds at Pottery Mound in the Eastern Pueblo area. But this mix of undirected and ritually directed exchange does not account for the concentration of Hopi area utility sherds in the southwest portion of the site and in the South Midden relative to Hopi area decorated sherds. If Hopi area utility wares were part of a “Sikyatki package” at Pottery Mound, we do not see how their use by participants in such a package would lead to the uneven distribution of utility sherds relative to decorated sherds. We are therefore inclined to question the sufficiency of a “down-the-line trade plus ritual sharing” approach, just as earlier we questioned the “down-the-line trade” approach. Some additional factor seems to have been involved.

Table 4. Counts and percentages of Hopi area sherds.

	Midden			
	North	**West**	**North + West**	**South**
Collection type	**Stratigraphic Test**	**Surface Collection**	**Mixed**	**Surface Collection**
Hopi area painted sherds	222	13	235	69
As % of all Hopi area sherds	92.9%	86.7%	92.5%	48.6%
Hopi area utility sherds	17	2	19	73
As % of all Hopi area sherds	7.1%	13.3%	7.5%	51.4%
Total Hopi area sherds	239	15	254	142
Total Sherds	*38,429*	*5,366*	*43,795*	*10,747*
Hopi area as % of all sherds	*0.6%*	*0.3%*	*0.6%*	*1.3%*

Adding Migration?

By positing two simpler explanations, and then questioning their sufficiency based on the data, we arrive at the need to conjure migrants (or return migrants) from the Hopi area as one source of the patterns in Hopi area sherds at Pottery Mound. Eckert (2003, 2007, 2008) arrived at the same conclusion years ago by noticing evidence that household practices, not just ritual knowledge, had traveled to the site. (As one example, some pottery made from local pastes was left untempered, as was the habit for Hopi area painted yellow ware.) We view our current arguments as reinforcing Eckert's work through the use of new data. One thing that Eckert could not do, given the data available to her, was to suggest where migrants/returnees from northeast Arizona lived within Pottery Mound. Today we can propose that those members of the community resided in the southwest quadrant of the site. Moreover, they tended to discard their broken utility pots near their homes, usually in the South Midden as opposed to the North and West Middens. Not surprisingly, Hopi area decorated pottery circulated more widely in the village than Hopi area utility pottery—because the former was, in fact, a prime candidate for any "ritual package" while the latter was not. Instead, use of Hopi area utility vessels was most likely part of a package of domestic habits learned in or from the Hopi area.[3]

Discussion

Our work indicates that to address the frequency and distribution of Hopi area pottery at Pottery Mound, no single explanation is sufficient. Exchange took place, in the sense that Hopi area vessels moved to Pottery Mound (with or without contents) as one of many commodities circulating in the late prehispanic Pueblo world. Nonetheless, down-the-line commodity exchange does not by itself explain why almost all of the Hopi area wares that reached the Eastern Pueblos wound up in one village. Proposing a package of ritual practices helps resolve the disconnect between a model of commodity exchange and the observed archaeological patterns, but not entirely. Adding a third behavioral element—a small resident population of individuals deriving (originally, or as returnees) from the Hopi area—brings us to a plausible way to account for the site's internal distribution of Hopi area pottery. To put it differently, attempting to choose a single explanation for the observed archaeological patterns at Pottery Mound is like the story of the blind men and the elephant. Here we have attempted to look beyond the parts to the whole.

At first glance our conclusions are incompatible with newly available dental data from Pottery Mound, but that is not the case. The dental study's unit of comparison was whole villages, or even clusters of villages; if Pottery Mound included a few families from the Hopi area, the study could have overlooked them (see O'Donnell et al. 2020:509). If the Hopi area connection was instead maintained by a few Pottery Mound families who sometimes migrated to and from that area, those families would be indistinguishable from others in the dental study.

If the migrants were few, however, they could not have carried with them all the Hopi area pottery found at Pottery Mound. Given that fact, and given the resolution of the available data, it makes more sense to speak of enduring connections between areas, including long-term trade relationships and migration, without focusing on directionality. But somewhere, somehow, a few residents of Pottery Mound picked up the habit of using pottery—both decorated and utility wares—made 350 km to the west. Either that, or they made repeated use of goods carried in those containers. Arguments that they picked up such habits anywhere besides northeast Arizona quickly become contorted.

Migration is a recurring theme in Hopi oral history, with groups joining the Hopi population and adding ceremonies to Hopi ritual life, and sometimes leaving. Moreover, migration, religion, and trade could work together, with each of those activities building social ties that enabled the other activities to take place. These topics are covered elsewhere (Hays-Gilpin et al. 2019) and will not be repeated here.

Past archeological use of "migration" often implied unidirectional movement, from the area where certain traits emerged to areas where those traits later appeared. However, once a migration route existed it could be a two-way street. And when we turn from migration in the abstract to specific movements of individuals, families, or communities, it is difficult to not see those movements as establishing, reflecting, or reinforcing long-distance connections. In particular, the east-west connection we see at Pottery Mound predated the establishment of that village. Abundant imports of St. Johns and Heshotauthla Polychromes had flowed into the small Coalition period villages of the Rio Grande region during the prior century and inspired the Rio Grande Glaze Ware tradition. Even earlier, whiteware and utility ceramics of the region were an extension of Cibola traditions to the west. During the Classic period, Pottery Mound was well positioned to serve this connection; it lay between the pueblos of the Rio Grande Valley and the Acoma area to the west. Pottery Mound's ceramics and kiva murals indicate that it did straddle the divide between the Eastern and Western Pueblo worlds. Pottery Mound began declining in the late 1400s, but ethnohistoric accounts show that the east-west connection continued. It is easy to imagine that, for a while, this connection included a culturally and linguistically diverse community next to the Rio Puerco.

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End Notes

1. As Dennis Gilpin pointed out in comments on a draft, positing a Sikyatki "ritual package" is not without its hazards. In the Hopi area, the Sikyatki style occurs primarily on pottery and only rarely in murals, but at Pottery Mound the style is more common, percentage-wise, on murals than on pottery. The subject matter of murals is not identical to the subject matter on pots. If murals were painted by men and pottery by women, we face additional complications based on gender. We leave the consideration of how a Sikyatki ritual package might have worked to a future paper, or perhaps to future scholars.

2. Obvious differences in paste, temper, surface finish, and paint make it easy to distinguish sherds from what is now the Hopi area from yellow Rio Grande Glaze Ware sherds, usually with nothing more than the naked eye. For this study, all such identifications were checked using a 20-power hand lens or binocular microscope. The same obvious characteristics allowed for the identification of sherds as coming from Hopi decorated vessels (Jeddito Yellow Ware) rather than from utility vessels (Awatovi Yellow Ware), even when the sherds were from the unpainted portions of decorated vessels.

3. Franklin (2014) found that Western Pueblo utility sherds (including Hopi area sherds) at Pottery Mound showed sooting (from use) less often than local utility sherds, however, suggesting that Western Pueblo utility vessels were not as expendable as their local counterparts. We would expect this for utility vessels which were imported, in some cases at great effort, to reinforce one's sense of separateness. They would be used (otherwise, why bother transporting them?), but more carefully than back home.

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Mimbreños y Paquiméños: Historicism and the Ancestry of the Casas Grandes Ceramic Tradition

THATCHER A. ROGERS

Archaeological investigations in the prehispanic American Southwest/Northwest Mexico region have furnished some of the most anthropologically relevant case studies for exploring how and when people move and the social and physical impacts on local landscapes and existing populations (Cameron 1995; Cordell 1995; Harry and Roth 2019; Hegmon 2000; Lekson and Cameron 1995; Nelson and Strawhacker 2011). While most studies have historically focused on the movement of groups in the northern Southwest or more recently on the movement of contemporary Pueblo communities, archaeologists identify similar processes within the southern Southwest. Studies within the southern Southwest have primarily focused on readily apparent examples of migration, such as those found in the Safford and Lower San Pedro valleys (Clark and Lyons 2012; Neuzil and Woodson 2014; Woodson 1995). Yet archaeologists also advocate for far more difficult to discern migrations (e.g. Lekson et al. 2002), or ones for which the archaeological evidence is extremely limited (see Cordell 1995 for discussion of issues). One of the most widely hypothesized and debated, but underevaluated, migrations of people in the prehispanic Southwest is that of a proposed movement of Mimbres peoples into the Casas Grandes Valley during the twelfth or early thirteenth century.

This paper expands upon an earlier assessment of the debate regarding Mimbres-Casas Grandes relationships (Rogers 2020) and an evaluation of Mimbres pottery in northern Chihuahua (Rogers 2019a) by focusing on specific vessel forms and designs regarded as indicative of a Mimbres ancestry for the Medio Period Casas Grandes ceramic tradition. By restricting my focus to ceramic evidence, I do not disregard the other lines of evidence employed to bolster or reject Mimbres-Casas Grandes relationships but instead wish to focus on those lines of evidence found in both cultures for which we have the most data. It is likely, for example, that mortuary patterns in the form of subfloor, flexed inhumations may provide some of the most direct line of evidence for those arguing in support of Mimbres-Casas Grandes relationships; however, we have yet to fully discern how standard burial practices at Paquimé may have been as compared to other Casas Grandes sites.

It must also be noted that Mimbres and Casas Grandes ceramic traditions strongly share two contemporary attributes: 1) they have both been the subjective of extensive focus on the occurrence of elaborate, figurative decorations often to the detriment of our understanding of other historical processes and cultural attributes, and 2) they have both been extensively prized by museums and private individuals. The second point has resulted in the extensive looting and destruction of archaeological sites in the Mimbres Valley and in northern Chihuahua, resulting in the appalling and infamous desecration of human burials as well as large-scale bulldozing of sites such as the Galaz Ruin. There are few, if any Mimbres or

Casas Grandes habitation sites that do not contain evidence for looting in several rooms, if not every room in every structure. Furthermore, many ceramic vessels that are in private collections, and even in museums, have been subjected to modern day reconstruction, additions, or complete forgery. As a result, vessels reported to have come from the Mimbres or Casas Grandes areas, but lacking provenience data are correctly recommended to be treated with extreme caution as to their veracity. *Caveat emptor*.

The Mimbres (A.D. 750-1130)

The Mimbres archaeological culture is renowned for finely-decorated black-on-white pottery and a relatively rare mortuary practice—the interment of deceased individuals under the floors of occupied structures. Excavations in the Mimbres Valley focusing on the Mimbres culture represent some of the earliest in the Southwest, although a sizable gap in research between 1935 and 1975 led to the area losing its prominence within Southwest archaeology. Nevertheless, contributions by the Mimbres Foundation and several researchers have supported and improved the chronology and understanding of historical trends in the area (Figure 1).

Three Circle Phase (A.D. 750-1000)

The Three Circle Phase is one the most dynamic and important periods to understanding the succeeding Mimbres Classic period as during this phase the production of Mimbres Black-on-white was initiated and land-holding, agrarian, corporate groups emerged (Anyon and Roth 2018; Shafer 2003). A central component within Three Circle Phase sites were great kivas (subterranean, rectangular, ramped structures used for group-based ceremonial practices; Creel et al. 2015). During the late Three Circle Phase, increasing village sizes correspond with more formalized architecture, increasing great kiva size, and changes in burial practices (Anyon and Roth 2018). These changes are interpreted as reflecting broader changes towards suprahousehold organization strategies and increasing interaction with populations to the west (i.e., Hohokam; Creel 2014). Many of these processes, particularly those tied to the great kivas, appear to continue beyond a relatively rapid and recently identified termination of most great kivas in the Mimbres Valley around A.D. 920 (Anyon and Roth 2018).

The construction of shallow, sunken rooms with adobe, cobble or thin adobe walls, the continued production of Mimbres Boldface (Style I) and Mimbres Transitional (Style II) pottery with a slight increase in figurative designs, and the use of sunken ceremonial structures characterize the A.D. 930-1000 time period, which has recently been designated the Transitional Phase (Sedig 2020; Sedig et al. 2018). While relatively recently identified, the Transitional Phase is a strong, important chronological development in the region and is central to understanding the Mimbres Classic Period. This is because not only is the Transitional Phase indicative of the pithouse-to-pueblo transition in the Mimbres area, but it is also a period of ritual "reset" initiated with the termination of great kivas and the onset of the Mimbres Classic Period ritual system inferred by many as associated with Mesoamerican Hero Twin iconography (Gilman et al. 2014; Sedig et al. 2018).

Mimbres Classic Period (A.D. 1000-1130)

As part of one of the most iconic time periods in the prehispanic Southwest, the elaboration and innovation of existing cultural practices and the burgeoning interaction between communities living in southwestern New Mexico and those to the west in central Arizona (Hohokam), those to the south in northern Chihuahua (Casas Grandes), those to the east along the Rio Grande and in the Tularosa Basin (Jornada Mogollon), and those further afield, potentially in northwestern New

<table>
<tr><th>Dates (A.D.)</th><th colspan="2">Mimbres Valley</th><th>International Four Corners</th><th>Northwest Chihuahua</th></tr>
<tr><td>1450</td><td colspan="4">Protohistoric Period</td></tr>
<tr><td>1400</td><td rowspan="3">Late Postclassic Period</td><td rowspan="3">Cliff Phase</td><td rowspan="4">Animas Phase</td><td rowspan="5">Late Medio Period</td></tr>
<tr><td>1350</td></tr>
<tr><td>1300</td></tr>
<tr><td>1250</td><td rowspan="3">Early Postclassic Period</td><td rowspan="3">Black Mountain Phase</td></tr>
<tr><td>1200</td><td rowspan="14">San Luis Phase</td></tr>
<tr><td>1150</td><td>Early Medio Period</td></tr>
<tr><td>1100</td><td rowspan="3">Mimbres Classic Period</td><td>Terminal Mimbres</td><td rowspan="3">Late Viejo Period</td></tr>
<tr><td>1050</td><td rowspan="2">--</td></tr>
<tr><td>1000</td></tr>
<tr><td>950</td><td rowspan="9">Late Pithouse Period</td><td rowspan="2">Transitional Mimbres Phase</td><td rowspan="9">Early Viejo Period</td></tr>
<tr><td>900</td></tr>
<tr><td>850</td><td rowspan="3">Three Circle Phase</td></tr>
<tr><td>800</td></tr>
<tr><td>750</td></tr>
<tr><td>700</td><td rowspan="2">San Francisco Phase</td></tr>
<tr><td>650</td></tr>
<tr><td>600</td><td rowspan="2">Georgetown Phase</td></tr>
<tr><td>550</td></tr>
<tr><td>500</td><td rowspan="7">Early Pithouse Period</td><td rowspan="7">--</td><td colspan="2" rowspan="7">Plainware Period</td></tr>
<tr><td>450</td></tr>
<tr><td>400</td></tr>
<tr><td>350</td></tr>
<tr><td>300</td></tr>
<tr><td>250</td></tr>
<tr><td>200</td></tr>
</table>

Figure 1. Chronology for the Southern Mogollon.

Mexico (Chaco Canyon), West Mexico (Nayarit, Jalisco, and Colima), and the Huastec area along the Gulf Coast characterize the eleventh and early twelfth century Mimbres Classic Period (Creel 2014; Gilman et al. 2014; Kurota et al. 2019; Lekson 2009, 2015). With the construction of above ground masonry architecture in communal roomblocks and compounds, Mimbres villages grew to include several hundred structures. Notable villages located along the Mimbres Valley include (from north to south): Mattocks Ruin, Galaz Ruin, Swarts Ruin, NAN Ranch, and Old Town Ruin. These sites have been explored and reported on, although Swarts and Galaz were excavated in the 1920s whereas explorations at the others occurred in the 1970s-1990s (Anyon and LeBlanc 1984; Cosgrove and Cosgrove 1932; Creel 2006; Gilman and LeBlanc 2017; Shafer 2003).

The key material culture development during the Mimbres Classic Period was the production of Mimbres Black-on-white, Style III (commonly termed Classic Mimbres) pottery and one of the earliest polychrome types in the prehispanic Southwest, Mimbres Polychrome. Classic Mimbres pottery is renowned for the painting of zoomorphic and anthropomorphic figures both as isolated occurrences and in scenic depictions of hunting, farming, gaming, etc. (Brody 1977; LeBlanc 1983). While figurative depictions have historically received a sizable amount of interest and been the basis for ample research endeavors, the majority of Classic Mimbres pottery was decorated with geometric designs. With the inclusion of a red-orange or yellow color as a filler, Mimbres Polychrome is extremely rare and developed during the terminal Mimbres Classic Period (A.D. 1075/1100-1130). Most Mimbres Polychrome designs are the same as those on Mimbres Black-on-white and there are no known differences between the two in terms of one having more figurative motifs present (Carlson 1982).

The production of Mimbres Black-on-white pottery terminated around A.D. 1130, and the clear break is one facet of Mimbres archaeology that surprisingly remains one of the least discussed changes. Few explicit discussions exist that explore how or why a sizable depopulation event in the Mimbres Valley occurred (c.f., Minnis 1985). Even fewer researchers suggest reasons for why Classic Mimbres pottery was no longer produced beyond nebulous statements regarding significant societal shifts (e.g., LeBlanc 2018:263-264 for a rare example). Lastly, investigations have specifically found the A.D. 1130-1180 interval difficult to identify archaeologically (LeBlanc 2018:264-265). While more recent investigations at Black Mountain Phase sites have identified important trends (summarized below), they are nearly exclusively from contexts post-dating A.D. 1180.

Post-Mimbres in the Southern Mogollon (A.D. 1130-1450)

One of the more debated topics in Mimbres archaeology is what happened directly after the Classic Mimbres Period. The absence of sizable villages such as those occupied in the eleventh century led many archaeologists to propose a sizable decrease in the local population. While many archaeologists identify strong cultural continuity within the Mimbres Valley at reoccupied sites (Creel 1999; Putsavage 2015; Putsavage and Taliaferro 2018; Taliaferro 2014), others see significant depopulation of the valley and adjacent areas (Blake et al. 1986; LeBlanc 1980, 1989; Minnis 1985; Shafer 1999). The limited exploration of Black Mountain Phase sites was a key attribute in this misunderstanding—surveys rarely identified them in the frequencies expected given the number of Classic Mimbres sites and more ephemeral composition of post-Mimbres sites. While excavation at several Black Mountain Phase sites has improved our understanding of what they look like archaeologically, there is still a near absence of clear habitation sites in and around the Mimbres Valley that can be definitively associated with the A.D. 1130-1200 period (see Putsavage and Taliaferro 2018 for a recent summary).

In general, dynamic population movement and growth, the development and spread of the Salado and Casas Grandes religious systems and material culture, and the formation of a new regional polity centered at the site of Paquimé characterize the southern Mogollon area after Mimbres Classic period. As this paper explores relationships between the two regions, I discuss both areas up to A.D. 1300, and Chihuahua after A.D. 1300. This distinction exists because archaeologists who argue for a direct relationship between Mimbres, or directly post-Mimbres, movement into northern Chihuahua suggest the evidence becomes more visible starting around A.D. 1280.

The Black Mountain Phase (A.D. 1130/1150-1300)

The Black Mountain Phase initiated with the end of the Mimbres way of life and represents a diverse array of responses by individuals. While surveys of sites document the continued use of above ground structures, they include both masonry and, more commonly, adobe architecture (Putsavage and Taliaferro 2018). The ceramic assemblages exhibit notable shifts with the introduction of Jornada Mogollon types such as El Paso Bichrome, El Paso Polychrome, and Chupadero Black-on-white, Casas Grandes associated types such as Playas Red and Casas Grandes Corrugated, as well as the continuation of Reserve Black-on-white and Mogollon corrugated types (e.g., Reserve, Tularosa). Settlement patterning of Black Mountain Phase sites showcases a mixture of small, dispersed sites throughout the Mimbres Valley and relatively large communities located near Mimbres Classic Period roomblocks (such as at NAN Ranch, Old Town Ruin, and Swarts Ruin).

The termination of the Black Mountain Phase and the onset of the Cliff Phase (A.D. 1300-1450) in the Mimbres and Upper Gila valleys coincided with the introduction of Salado Redwares into the ceramic tradition and the construction of new villages and architectural layouts. This transition is thought to have been less dramatic than the shift from Mimbres to Post-Mimbres given the continued occupations at many sites (Putsavage and Taliaferro 2018). After A.D. 1300, sites, particularly in the Upper Gila River Valley, expanded in size as did other sites lying between the Casas Grandes and Mimbres valleys in what archaeologists term the Animas Phase (Rogers 2019b).

The Medio Period (A.D. 1150-1450)

The Early Medio Period (A.D. 1150-1275) is a significant but relatively poorly understood time period for northern Chihuahua. Investigations at several sites demonstrate the expansion of small hamlets of appended, above-ground structures into roomblock compounds, the production of early Chihuahuan polychrome types, and the habitation of sites that would become important components in the Late Medio period regional system characterize the Early Medio period (Whalen and Minnis 2009). Early Medio period sites do not appear to be arranged in regional organization at any moderate to high level as is found in the succeeding Late Medio Period, nor do they show any clear similarities with the contemporaneous Black Mountain Phase in the Mimbres Valley or a significant influx of individuals.

The Late Medio Period (A.D. 1275-1450) is synonymous with most discussions regarding the Casas Grandes culture and the paramount site of Paquiné. The construction of adobe compound roomblocks, the largest of which are associated with hilltop shrine complexes called *atalayas*; the production of Ramos Polychrome and other polychrome ceramic types; the elaborate use of aviculture; and the formation of clear settlement clusters established in a hierarchical manner characterize this time period that spanned the terminal thirteenth through mid-fifteenth centuries (Di Peso 1974; Whalen and Minnis 2001, 2009). The focal point of the entire Casas Grandes regional system was the site of Paquimé (also termed Casas Grandes).

Paquimé is one of the largest known sites in the prehispanic American Southwest/Northwest Mexico region and can arguably be stated as its only definitive city. Paquimé is notable for a projected population of upwards of 2,500-5,000 people (Di Peso 1974; Lekson 2009; cf. Whalen et al. 2010), an established civic-ceremonial core located to the west of the substantial three- to five-story adobe residential complex, the presence of aviculture centered on the breeding and sacrifice of macaws, and the accumulation of shell and mineral ores in exorbitant quantities (e.g., nearly 4,000,000 shell artifacts mostly centered in a single structure; Di Peso 1974; Di Peso et al. 1974). The sheer size of Paquimé is nearly a magnitude larger than all other sites in the region and this has led some archaeologists to argue for a sizable population influx, particularly from the Mimbres area (Lekson 2009, 2015). Paquimé was the center of a stratified chiefdom society with several ties to Mesoamericanized West Mexico, but it also engaged in unusual exchange patterns with groups living in the Upper Gila Valley (Lekson 2002).

While what Paquimé represented remains a highly debated, yet under-investigated phenomenon, other Late Medio period communities showcase important trends and provide important normalizing data for how to broadly interpret the post-A.D. 1300 period in northern Chihuahua. Sites such as La Tinaja or Site 315 demonstrate that the next largest Medio Period sites are situated within drainage and valley-wide settlement systems, produced Ramos Polychrome and other ceramic types, and contain several hundred rooms (Triadan et al. 2018; Whalen and Minnis 2001, 2009). These sites also are often associated with *atalaya* shrines and Mesoamerican-style ballcourts yet they lack the civic-ceremonial east/west divisions found at Paquimé as well as the clear extensive ritual caching within structures. Most Medio Period sites are even smaller and range between 15-50 rooms arranged in small roomblock compounds with extramural space. Coincidentally, while sudden population aggregation at the largest of sites, such as Paquimé, is clear and may, potentially, have been due to incoming post-Mimbres populations, most Medio period sites do not exhibit evidence of similar population influx.

The Debate

The debate regarding the relationship between Mimbres and Casas Grandes is not one restricted to the past few decades; rather, it has lasted as long as archaeologists have conducted investigations in the American Southwest. Adolph Bandelier (1892:350-351) was perhaps the first to note similarities between Mimbres and Casas Grandes ceramic designs, although his statements have been overinterpreted as Bandelier merely saw the similarities as exemplifying "Pueblo pottery in the widest sense of the term." By that, Bandelier (1892:350) meant he noted the shared production of corrugated types, painting of stepped terraces, banded designs, and combination of different motif types; and while he favorably viewed Mimbres and Casas Grandes pottery as showcasing the same array of these attributes, he emphasized their similarities to other areas of the Southwest by stating "the same fundamental patterns underlie that decoration as in Utah, in Colorado, in Northern New Mexico, in the Rio Grande valley, in short, everywhere where pueblos are found." Thus, Bandelier saw the relationship as simply a broadly shared Ancestral Pueblo/Mogollon artistic expression.

J. Walter Fewkes was the next to identify and discuss Mimbres-Casas Grandes relationships as part of his repeated visits to the Mimbres Valley and documentation of local collections there for the Smithsonian Institution. Fewkes (1924) identified several Mimbres designs he noted as emblematic of later Casas Grandes vessels. These included a curved appendage to the body of a quail that Fewkes describes as like the club-shaped bodies painted on Casas Grandes vessels (Fewkes 1924:9, Figure 29), although he noted how rarely such a shape appeared on Mimbres Classic vessels (Fewkes 1924:26). Fewkes is accurate in that the quail depiction does showcase strong similarities to the feather depictions found on Ramos Polychrome; however, those found on Casas Grandes polychromes are nearly exclusively associated with macaws, not other bird species. Fewkes (1924:22-24) also identified several key differences such as vessel morphology, use of smudged and burnished wares, differences in design composition and layout, and the more widespread occurrence of redwares in northern Chihuahua. Lastly, Fewkes (1924:23) notes that the diversity of animals represented on Casas Grandes ceramics is far lower than that identified on Mimbres ceramics and that the painting of humans on Casas Grandes vessels is more limited (discussed below).

Alfred V. Kidder (1916, 1924) identified several strong similarities between Mimbres and Casas Grandes painted pottery after his investigations in the Babícora Basin in Chihuahua. These mainly took the form of noting the shared use of negative drawing, a stylistic attribute highly uncommon in the Southwest. Nevertheless, as of 1924, how Mimbres related chronologically to other archaeological cultures was in question, with Kidder (1916:268) believing Mimbres to be a late, but relatively geographically restricted cultural fluorescence as opposed to Fewkes' argument for an earlier temporal context. Based on his excavations, Kidder (1916:268) described Mimbres figurative designs as "neither parent to nor derived from the more limited naturalism of Casas Grandes" as the chronology for the region had yet to be defined. Rather, Kidder (1916:267) focused on the Southwestern aspects of the Casas Grandes ceramic tradition by emphasizing the shape and relatively simplicity of vessel forms and design layout and elements as compared to Mesoamerican contemporaries. As a result of early work by Fewkes and Kidder, many Southwestern archaeologists suggested the existence for many general similarities between Mimbres and Casas Grandes ceramics, including Eleanor Clarke (1935:58), Harold Gladwin (1936:95-96), Emil Haury (1936:130), Paul Nesbitt (1931:98), and E. B. Sayles (1936:88). Thus, the consensus in early and influential Southwestern archaeology circles and publications was that there clearly existed a relationship between the two ceramic traditions and, by extension, the two archaeological cultures.

Until the Mimbres Foundation work in the 1970s and the Amerind Foundation's report on the excavations at Paquimé and other Casas Grandes sites, archaeologists lacked the chronologic control and regionwide understanding to assess whether the relationship was based on a shared contemporaneous or an ancestor-descendent heritage. This was because while Classic Mimbres was restricted to between A.D. 1000 and A.D. 1150 with numerous supporting tree ring dates restricting the period further to A.D. 1130, Charles Di Peso interpreted tree ring dates and radiocarbon probabilities from Paquimé to suggest an eleventh to twelfth century occupation contemporaneous with Mimbres and Chaco. Regardless of this chronology, Di Peso and colleagues (1974:6:102) noted that many of the previously suggested similarities were inaccurate or not diagnostic.

As per the dating, imported ceramic types recovered from within Paquimé such as St. Johns Polychrome and Salado Redwares strongly suggested the site was post-Mimbres, but lacking robust absolute dates and the final report until 1974, few archaeologists could contradict Di Peso's interpretation. This is exemplified in the discussion regarding Mimbres and Casas Grandes as contemporary and related ceramic traditions by J. J. Brody (1977:71-74). Brody clearly accepted the reported Paquimé dates in his repeated discussions of Mimbres and Casas Grandes exchange interactions and of population and social dynamics. Roy Carlson (1982:212-215) also argued for the presence of a relationship based on similarities in motifs and the shared use of early polychrome paint. Overall, however, Carlson noted that these similarities were not definitive, and they may simply be part of a long-term and broadly shared Mogollon decorated ceramic tradition (Carlson 1982:215).

Furthermore, the contrast between settlement sizes and material culture from the Mimbres Classic period to the subsequent Black Mountain Phase has led scholars historically to view this disjuncture as a significant break. Debates over what the Black Mountain Phase, previously termed the Animas Phase which is more directly related to Casas Grandes (see Rogers 2019b), indicated culturally were commonplace in the 1980s and 1990s (see Creel 1999; LeBlanc 1989; Shafer 1999). Coinciding with this discussion was a critical evaluation of the dating of Paquimé and the Medio period (Dean and Ravesloot 1993; LeBlanc 1980; Lekson 1984). With the understanding that

Paquimé, at least in its most widely discussed form, did not develop until sometime in the late thirteenth or even early fourteenth century, some archaeologists advocated for a relationship between the Mimbres Class period/Black Mountain Phase disjuncture and the emergence of Casas Grandes as a regional polity. Notable amongst these were Steven LeBlanc and Stephen Lekson, two highly accomplished scholars with extensive experience in the Mimbres and/or Chaco areas and who had already openly questioned the dating of Paquimé, and Barbara Moulard.

LeBlanc (1983, 1989, 2018) advocates for a clear-cut ancestral relationship between Mimbres and Casas Grandes based on several lines of supporting data, including dental traits (LeBlanc et al. 2008), shared ceramic morphology (LeBlanc 2018), and an interpretation that Paquimé originated earlier than most suggest and that there may be a Mogollon-style Great Kiva there (LeBlanc 1989, 2018; also see Lekson 1999). LeBlanc (2018) further suggests that if the Casas Grandes ceramic traditions developed by A.D. 1200, then there are approximately three generations between the end of the Mimbres Classic ceramic tradition and the onset of the Casas Grandes polychrome tradition. Just as Brody's (1977) interpretations were established prior to the redating of Paquimé as a definitively post-Mimbres phenomena, LeBlanc's (1989:192-194) discussion of Mimbres-Casas Grandes relationships seem to showcase a similar historically-contingent error given his discussion of post-Casas Grandes (LeBlanc 1989:196-199).

In contrast, Lekson (1999, 2015) sees the relationship as not only ancestral but part of a larger historical process occurring within the Southwest—the Chaco Meridian. The Chaco Meridian, as proposed and updated by Lekson (2015), is a hypothesized narrative that relates the movement of elite individuals and associated individuals over time to explain definitive and inferred relationships between Sacred Ridge-Blue Mesa, Pueblo Bonito, Aztec Ruins, Paquimé, and Culiacán. Central to this connection is the relationship between Mimbres and Chaco, with Lekson suggesting the presence of at least two Chacoan Great House communities within the Mimbres region (Woodrow Ruin and Baca Ruin; 2015:45-46). While there have been many criticisms regarding the Chaco Meridian, the current consensus is that the center, northern portion of the Meridian from Pueblo Bonito to Salmon and Aztec Ruins is robust (Reed 2008). In contrast, few archaeologists support or even acknowledge the possibility for the southern portion of the Meridian from Aztec Ruins to Paquimé. Regional and even superregional interaction between Mimbres and Casas Grandes and other areas are well-founded (Di Peso 1974; Gilman et al. 2014); however, investigations or even discussions of potential relationships between Mimbres and Chaco Canyon have been nearly non-existent in the archaeological literature (see Lekson 2015:45-48).

Lastly, Barbara Moulard (2005) argues for a more indirect relationship between Mimbres and Casas Grandes based on the incorporation of Mimbres and other Mogollon peoples and ceramic design layout and motif similarities. Moulard (2005:78) suggests that there is a direct relationship between local Casas Grandes leadership positions (what she interprets as priestly elite) and their use of Classic Mimbres designs to "solidify their rank in the expanding, ethnically diverse culture." Moulard sees this revival of Mimbres attributes as inherently economic-driven and tied to the objectives by a priestly elite class to strengthen and maintain ties with trading partners to the north. While many of Moulard's interpretations are either inaccurate or not in line with most contemporary interpretations regarding Casas Grandes culture (see Kelley 2017), she does provide an alternative means to account for similarities between Mimbres and Casas Grandes. Thus while Lekson and LeBlanc, most prominently, argue for an ancestral relationship between Mimbres and Casas Grandes and point to what they see as a stronger affinity between Mimbres and the Medio period than between the Viejo and Medio periods, Moulard sees the relationship as driven by Paquimé's priestly elite to establish and solidify their association with more northern, Ancestral Pueblo cultural traditions.

The presence of three relatively robust and recent suggestions for a strong Mimbres-Casas Grandes relationship, bolstered by additional data such as demographic estimates, genetic similarities, and mortuary practices, should have resulted in a productive scholarly debate. A short evaluation of some of the existing data employed in support of Mimbres-Casas Grandes relationships is provided elsewhere (Rogers 2020). However, few researchers have broached the topic, with most either ignoring or dismissing with comment lines of evidence or resolving to not directly evaluate the proposed lines of evidence. This occurrence, while understandable given the negative critical to selective unawareness response by many Southwestern archaeologists to Chaco Meridian in its entirety (although several aspects of it are clearly substantiated), is scientifically problematic and detrimental to our understanding of the past for a poorly understood area. Prior to dismissing interpretations by LeBlanc, Lekson, Moulard, and others, a careful assessment of their validity is required.

Proposed Lines of Evidence

Some Mimbres archaeologists have proposed specific vessel forms and decorative attributes they see as indicative of an ancestral relationship to the Medio Period Casas Grandes ceramic tradition. Notably, they ascribe significance to the shared attributes such as vessel morphology, painting composition and layout, and the way some humans are depicted. As both Mimbres and Casas Grandes iconographic-based arguments are typically based on a few published vessel images, it is difficult to assess how normative any denoted trends are within their broader respective ceramic tradition populations. Nevertheless, for this section, I discuss the most common lines of ceramic evidence and then evaluate their validity.

Vessel Morphology

One intriguing line of evidence employed to suggest a relationship between Mimbres and Casas Grandes ceramic traditions is that of vessel morphology (Figure 2). While the overwhelming majority of Classic Mimbres vessels are bowls, the opposite is true for Casas Grandes polychrome vessels. This shift, also found in terms of decorated pottery trends from Mimbres Classic period to Black Mountain Phase, is notable and worthy of investigation if any relationship is supported. As a result, research into proposed relationships focuses instead on Mimbres jars, particularly miniature jars that are appropriately labeled *ollas* (LeBlanc 2018:268-269). This vessel form is highly emblematic of the iconic Casas Grandes *olla* form that became popular by the Late Medio period, but is clearly identifiable within Early Medio period assemblages, and differs from the more common gourd (or *tecomate*) shaped vessel visible in nearly all Southwestern ceramic traditions. Based on examination of a few of these vessels curated by the Maxwell Museum of Anthropology and photographs in several published volumes, these Mimbres vessels can be described as followed. They are relatively squat with a maximum diameter and soft-to-nonexistent shoulder situated below the midline of the vessel height. Unlike late Casas Grandes jars, however, most Mimbres designs initiate at around the maximum diameter, while Casas Grandes designs frequently extend below.

There are less than a dozen of these jars identified from Mimbres sites, although others may exist in private collections, making weak any argument that rests solely on a shared vessel morphology. Unfortunately, these vessels have not yet been subjected to extensive morphometric analysis, and even then, any relationship between them and Casas Grandes vessels is debatable. A

Figure 2. Examples of miniature and standard Mimbres jars and Casas Grandes jars. Top left, Mimbres Black-on-white miniature jar (Image courtesy of Steven LeBlanc, Maxwell Museum of Anthropology, Catalogue No. 89.48.6); top right, Mimbres Black-on-white jar (Image courtesy of Museum of New Mexico, Catalogue No. 19594/11); bottom left, Ramos Polychrome jar (Image courtesy of Museum of New Mexico, Catalogue No. 20900/11); and bottom right, Ramos Polychrome jar (Image courtesy of Museum of New Mexico, Catalogue No. 8343/11).

stronger analysis would focus on assessing the relationship between these Mimbres jars and Late Viejo/Early Medio period Casas Grandes vessels, or tie them extensively to Moulard's argument for intentional archaic emulation. Designs on earlier Casas Grandes vessels are most similar in layout and composition to Mimbres pottery than Ramos Polychrome; however, they are also woefully underrepresented in studies of Casas Grandes pottery. It is possible, although unlikely, that this similarity is supportive of the larger Mimbres-Casas Grandes relationship.

Negatively Painted Figurative Elements

Fewkes (1924:10) was the first to provide a robust description of the shared depiction of animals and geometric designs using negative space (although Kidder noted it in 1916:265). This occurs when the background is painted instead of the subject itself so that a figure illustrated by the unpainted area (Figure 3). This type of depiction is rare in Southwestern ceramic traditions and by far most common in Mimbres figurative designs, including those of people (Brody 2004). In contrast, on Casas Grandes vessels this is most encountered with depictions of macaws and other birds (Kidder 1916; VanPool and VanPool 2007). A few human depictions are known, although these are rare (see Kidder 1916:Plate VII for additional examples). Unfortunately, more detailed discussions of negative painting in Casas Grandes ceramics are limited (see Di Peso et al. 1974). It is somewhat likely this similarity is supportive of the idea of the larger Mimbres-Casas Grandes relationship, although how it is interpreted does vary (e.g., Moulard 2005).

Depiction of Horned/Plumed Serpents

The third line of ceramic evidence proposed by researchers is a relationship between how Mimbres and Casas Grandes painters depicted horned or plumed serpents (Figure 4). This is predominately based on assessments by Steven LeBlanc (personal communication, 2020) and a quantitative study undertaken by Leonard (2001). VanPool et al. (1999; cited in Phillips et al. 2006) employed similar methods, although they identified a shift from one to two regional cults in Southwest

Figure 3. Negatively painted figurative designs on Mimbres and Casas Grandes vessels. Left, Mimbres Black-on-white bowl (Image courtesy of Museum of New Mexico, Catalogue No. 19942/11); and right, Ramos Polychrome jar (Image courtesy of Museum of New Mexico, Catalogue No. 20872/11).

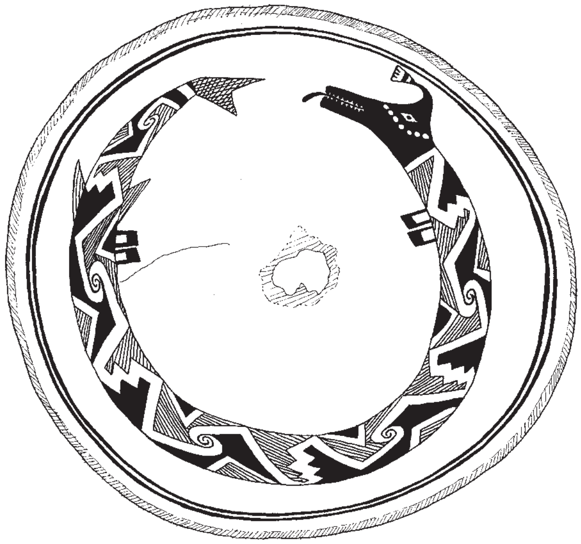

Figure 4. Depictions of horned serpents on Mimbres and Casas Grandes vessels. Left, Mimbres Black-on-white bowl (Image courtesy of Margaret Berrier, Vessel MimPIDD No. 3874); and right, Ramos Polychrome jar (Image courtesy of Museum of New Mexico, Catalogue No. 8313/11).

horned serpent imagery (Phillips et al. 2006:19). The orientation of the horn, with the forward-curling horn centered in the Casas Grandes and El Paso Phase (A.D. 1275-1500) Jornada Mogollon areas and the backward-curling horn widely depicted on Salado Redware (see Crown 1994) distinguished these two cults. Lastly, Phillips and colleagues argued for the development of a third regional cult in northern New Mexico emerging around A.D. 1325, or slightly after the advent of Rio Grande Glaze ware.

Few Classic Mimbres vessels have horned or plumed serpent depictions and, given the number of embellished or outright faked motifs, it is otherwise difficult to provide an accurate estimate of how many known vessels there are. Depictions of serpents in Mimbres are commonly shown in two-dimensional profile, with a single feathered horn arcing forward. As noted by Phillips and colleagues, this design does show similarities to that found on Casas Grandes vessels, but there are several caveats. First, Casas Grandes painters depicted numerous different types of serpents and even including coloration and texture-like designs to identify potential species (VanPool and VanPool 2007). Second, serpents on Casas Grandes vessels are commonly depicted in raised, three-dimensional plan view with both eyes visible, although most of these would not qualify as plumed or horned serpents. Most clearly defined horned serpents on Casas Grandes vessels incircle the exterior as a diagonal band and showcase a forked tail, often with a bird located between the forks, and with an open mouth and tongue protruding. These are also depicted in a plan view, with "horns" extending upward on the vessel from the end of jaw and extending both forwards and backwards. It is somewhat unlikely, but possible, this similarity is supportive of the larger Mimbres-Casas Grandes relationship given the cluster analysis results (for which the data are unavailable) and the fact that few prehispanic Southwestern societies painted clear horned serpents on vessels.

Depiction of Humans

The fourth suggested line of ceramic evidence is the manner and frequency with which humans are depicted (Moulard 2005; Figure 5). Depictions

Figure 5. Depictions of humans on Mimbres and Casas Grandes vessels. Top left, Mimbres Black-on-white bowl (Image courtesy of the Museum of New Mexico, Catalogue No. 20390/11); top right, Mimbres Black-on-white bowl (Image courtesy of the Museum of New Mexico, Catalogue No. 19975/11); center left, Ramos Polychrome jar (Image courtesy of the Centennial Museum, University of Texas at El Paso, Catalogue No. A36.85.18); center right, Ramos Polychrome jar (modified from Townsend 2005:Plate 40a, Private Collection); and bottom left, Ramos Polychrome jar (Image courtesy of the Museum of New Mexico, Catalogue No. 22017/11).

of humans are relatively rare on prehispanic Southwestern ceramic vessels with the possible exception of Mimbres, pre-Classic Hohokam, protohistoric Salinas, late prehispanic Hopi, and Casas Grandes pottery traditions. Cultures in many additional areas do depict human-like entities, but these are commonly interpreted as kachinas or other figures, such as those found on Rio Grande Glaze ware. Most of those areas show clear human depictions most prominently in rock art, not on ceramic vessels. Consequently, suggestions for an artistic heritage based on the shared depiction of humans are bolstered by the relatively common depiction of humans in Mimbres and Casas Grandes traditions.

With that stated, however, there are two significant issues. First, Classic Mimbres figurative designs are renowned not just for their attention to detail and presentation of animals and humans in two dimensions (as opposed to the use of three-dimensional designs in Casas Grandes), but also for the sheer variety of activities depicted. Classic Mimbres bowls showcase gardening, hunting of rabbits and large game (including bears), fishing, transporting or interacting with macaws, being attacked by animals/supernatural entities, states of trance or human-animal hybrids, wearing costume or other performative attire, partaking in sexual activities, childbirth, gambling, etc. (Brody 1977; LeBlanc 1983). In comparison, how many different activities have been identified on more than a single Casas Grandes vessel? Very few; with examples of humans undergoing trances or ritual activities or playing the Mesoamerican-style ballgame known (Townsend 2005; VanPool and VanPool 2007). There are also a few Casas Grandes effigies depicting sexual activities. Second, while there exist at least 300 known Classic Mimbres bowls with human depictions, an examination of over 3,000 Casas Grandes vessels identified only seven with humans painted on them (MimPIDD database; VanPool and VanPool 2007:60). Lastly, like the discussion of serpent iconography, while Mimbres depictions of humans are almost always done in profile, Casas Grandes depictions are typically directly facing the viewer and often incorporate a partial three-dimensional aspect (discussed below with effigies). It is unlikely this similarity is supportive of the idea of the larger Mimbres-Casas Grandes relationship given the sizable differences between how Mimbres and Casas Grandes painted humans, respectively.

The Seating of Elite Individuals

A less concrete but proposed line of evidence linking Mimbres to Casas Grandes through a specific iconographic depiction has been suggested by Lekson, although he has not definitively stated it as such in a publication to my knowledge. Lekson notes that on one Mimbres Black-on-white bowl (MimPIDD #1297; see Brody 2004:Figure 23) there exists a depiction of an individual seated on what appears to be a stool-like object. The individual is represented as a male with a hair bun, diamond-shaped eyes, and a white sash across his waist. He is leaning forward (to the left) and is handling an indeterminate woven object. The "stool" is a rectangular, solidly colored object with four subrounded legs and it is very short compared to the rest of the depiction. To the left of the seated individual is a standing individual lacking a sash but with the same hair bun and eye form (iconic of Mimbres depictions of humans, humans masquerading as animals, or supernatural/divine entities) and holding a staff with two notched, arrow-like protuberances. While it is likely additional Classic Mimbres vessels may have similar depictions, none are readily apparent in the MimPIDD database.

This vessel alone is not (in)significant, except excavations at Paquimé recovered an extremely high quantity of serpentine (ricolite) raw material and shaped artifacts (57.4 of 114.7 kg of serpentine at the site) from within a key caching structure (Room 18-8, Di Peso et al. 1974:8:188). This quantity of serpentine far exceeds all other known sites in terms of weight and variety of shaped objects, including sites near the probable serpentine source in the Upper Gila River Valley (Lekson 2002; Wallace 1998). Serpentine object types recovered from Paquimé included, amongst many different types, sizable blanks, shaped axes, fetish effigies, and ornamental pieces. Notable amongst these artifacts were a set of short, four-legged objects Di Peso and colleagues (1974:7:315-317) explicitly referred to as "stools."

This very limited comparison brings up several important questions, however: is the individual depicted on the Mimbres bowl an "elite" as we often think of those interred in specific locations within Paquimé (Lekson 2018:252)? What was the actual purpose of serpentine "stools" at Paquimé given they were cached away from the ceremonial core where elite individuals were interred? Is this similarity merely a result of important relationships between Paquimé and Upper Gila River Valley (Lekson 2000, 2002) during the late fourteenth century with little to do with the Mimbres Valley and Mimbres culture? It is fairly unlikely this similarity is supportive of the larger Mimbres-Casas Grandes relationship; however, it does pose interesting questions regarding leadership strategies and depictions in the southern Mogollon over time.

Effigy Vessels

The final ceramic-based attribute of note is that of zoomorphic and anthropomorphic effigy vessels (Brody 1977; Moulard 2005; Figure 6). Casas Grandes effigy vessels are well known both for their rare occurrence in archaeological assemblages spanning from the Tularosa Basin to the Lower San Pedro Valley and from the Upper Gila River Valley to possibly as far south as Mexico City, and for their unusual inclusion of diagnostic attributes that seem to denote a limited, shared set of individuals. Individuals kneeling or partially seated and holding cigar-like tubes are commonly referred to as "shaman" effigies (VanPool 2003), and while the shaman hypothesis has yet to be rigorous evaluated, it remains the main agreed upon hypothesis by Casas Grandes scholars (c.f., Cordell 2015:205-206; Moulard 2005:90). Yet while these complete effigies have received the majority of Casas Grandes iconographic research, most human figures on Casas Grandes ceramics are composed of facial features molded and painted on a "hooded" jar. Hooded jars are jars that have a vertical extension upward from the rim on approximately 1/3 of the rim. This extension is where the face of the human or animal effigies are molded and painted and the "hood" comes from a squared or rounded off portion that covers part of the vessel. The hooded component in the Casas Grandes ceramic tradition is present on both true effigy vessels (with hands, legs, genitalia, etc.) and figure vessels (i.e., vessels with just the head and perhaps molded arms atop an otherwise unmodified *olla* vessel form).

In Mimbres, human effigies are extremely rare, with fewer than a dozen known and provenienced examples, and only slightly more known zoomorphic effigy jars (e.g., Fewkes 1924:Figure 97). Many of these vessels share stylistic attributes with Classic Mimbres bowls, such as the use of diamond-shaped eyes to denote humans as opposed to the Casas Grandes ovaloid or slit eyes. Even if this difference is ignored, there are a few shared attributes with Casas Grandes vessels; notably, some have a squared head with what appear to be facial markings depicted, they include ears and other facial features that are shaped in many cases, and these faces are often situated in a manner than sets the vessel at an awkward center of balance (examples visible in Anyon and LeBlanc 1984:Plate 27e—MimPIDD #3408; Gilman and LeBlanc 2017:Appendix 15:Figure Tf for zoomorphic example and Appendix 15:Figure ARd for anthropomorphic example—MimPIDD #6632; Shafer 2003:Appendix 23g, Appendix 24b—MimPIDD #s 7698, 7703). With the same vessel population size issues mentioned previously with respect to the shared *olla* vessel morphology, these few known Mimbres Black-on-white effigies

Figure 6. Mimbres and Casas Grandes effigy vessel examples. Top left, Mimbres Black-on-white effigy fragment from Mattocks Site (Image courtesy of Margaret Berrier, Vessel MimPIDD No. 6632); top right, Mimbres Black-on-white effigy jar from NAN Ranch Site (Effigy, Middle Style III Bird-human, Room 29, NAN Ranch Ruin, Grant County, NM, NAN Ranch Collection, 2011.26.8-1518 (29:153), Photograph Courtesy of Western New Mexico University Museum, Silver City, NM); bottom left, Ramos Polychrome effigy jar (Image courtesy of Maxwell Museum of Anthropology, Catalogue No. 78.69.9); and bottom right, Ramos Polychrome effigy jar (Image courtesy of Museum of New Mexico, Catalogue No. 8315/11).

are almost all hooded or modified jars. While it is fairly unlikely this similarity is supportive of the larger Mimbres-Casas Grandes relationship, it does pose interesting questions regarding the associations between humans represented in effigies or painted forms and birds (see Moulard 2005; VanPool 2003).

Discussion

This discussion of several proposed ceramic lines of evidence establishes that while many of these reported links are present and valid, most cannot be considered diagnostic to only Mimbres-Casas Grandes and exist in other ceramic traditions that date to both Mimbres or Casas Grandes or between the two. Important differences such as which attributes a researcher employs to characterize Casas Grandes ceramic tradition must be discussed first as not only is the Casas Grandes ceramic tradition varied in the number of types and uses of polychrome but also in the specific design layout and composition. Furthermore, the limited analysis of Casas Grandes vessels curated at museums in a manner akin to that published by Crown (1994) or Robert Heckman and colleagues (2000) means comparisons are limited. Another key point to consider is that for every potential similarity, there are equally stark dissimilarities such as the absence of Tlaloc/goggle-eyed figures and Knifewing motifs from Casas Grandes vessels compared to their common occurrence on Classic Mimbres bowls (Thompson 2020). One understudied ceramic type that might serve as a case study for what Moulard argues was archaism emulation by Casas Grandes potters of Mimbres designs is Ramos Black-on-white (or more accurate Ramos Bichrome given the lack of any white slip or paint). This ceramic type variation, however, has received scant discussion by Casas Grandes researchers outside of Di Peso et al. (1974).

In broader perspective, just as significant as the relationship between Mimbres and Casas Grandes ceramics is the ceramic relationship between Casas Grandes and Chalchihuites and West Mexico. In fact, ceramics from the Chalchihuites culture of northern Durango and from Aztalan-associated (and the earlier Chupícuaro culture) communities in West Mexico were recovered in small quantities at Paquimé (Di Peso et al. 1974; although especially see concerns by Punzo and Villalpando 2015:175-176). Nevertheless, it is clear that the ancestry of Casas Grandes ceramics, while clearly variably influenced by "non-local" types such as Mimbres, West Mexico, Chalchihuites, Salado, etc., was local in origin and developed out of a shared Mogollon brownware tradition that extends to the Viejo Period, or at least A.D. 700 (see Di Peso et al. 1974:6:100-105; Kelley and Searcy 2015). These relationships, however, appear to have been predominately one-way based on the absence of Casas Grandes pottery in many of these source locations when focused solely on assemblages from temporal contexts during which archaeologists have suggested influence would have emanated from the Casas Grandes culture. In any case, these discussions as well as narrative interpretations of what Paquimé was, what Casas Grandes culture represented, and how it developed are integrally related to historical trends and charismatic individuals in archaeological research (see Kelley 2017 for an outstanding overview of this). One way forward is to individually evaluate the many criticisms regarding contemporary interpretations of Paquimé and trends in Southwestern archaeological inference (Cordell 2015; Kelley 2017; Lekson 2009, 2015, 2018).

To reiterate, this limited analysis of historical research trends and arguments for Mimbres-Casas Grandes ceramic relationships should not be interpreted as definitive, nor as a robust consideration of all the forms of potentially supportive data. Several lines of evidence, such as those proposed most strongly by Lekson, that remain in need of thoughtful consideration include the shared practice of subfloor, flexed adult inhumation and T-shaped doorways. While I have yet to independently evaluate these attributes as well as others less commonly discussed, I propose three hypotheses to account for the many discontinuities and surprising similarities between Mimbres and Casas Grandes:

1) There is a limited and insignificant ancestral relationship between Mimbres and Casas Grandes cultures. Casas Grandes developed within and adopted attributes of Mimbres culture through a broader *Présence* Mogollon (see Graves 2017). This hypothesis is hampered by the unfortunate longstanding lack of cross-border research in the area by Southwestern archaeologists deterred by the artificial modern border and the language barrier (although Paul Minnis is amongst the most accomplished archaeologists to have conducted field investigations on both Mimbres and Casas Grandes and sees little to no relationship).

2) There is a moderate, but relatively insignificant ancestral relationship between Mimbres and Casas Grandes. The shared similarities are the result of long-term cultural exchange between Mimbres and Viejo through Medio period Casas Grandes groups and represent the few aspects that survived because of these exchanges.

3) There is a strong but difficult to detect ancestral relationship between Mimbres and Casas Grandes cultures. The termination of the Classic Mimbres lifeway and its religious system resulted in profound and expansive behavioral changes. While many groups remained in the Mimbres Valley, others left, brought with them traditional Mimbres practices, and integrated themselves into existing groups. As a result of this integration, generalized practices such as the depictions of humans and production of human effigies on hooded jars continued as opposed to more iconic Classic Mimbres practices.

With the data currently available, it is difficult to definitively accept or reject one hypothesis over the others, although it is probable that either the first or third hypotheses are the most accurate and that none of them fully articulate what occurred in the past. In order to investigate differences between these hypotheses, additional data are required from existing Casas Grandes vessels (in a manner akin to that found in the MimPIDD), new and robust evaluation of the Di Peso Paquimé volumes and unpublished data are necessary, and migration model expectations should be systematically applied against the archaeological data. Furthermore, researchers need to rigorously pursue early Black Mountain Phase assemblages and their contemporaries in Chihuahua as this is the most likely time period in which potential migrant populations may be identified. Lastly, it is possible that the archaeological record will not provide any clear-cut answer regarding if Mimbres peoples moved into Chihuahua, given the stark debates over migrations based on limited directly supporting data elsewhere (e.g., Ortman 2012; Schillaci et al. 2020).

Conclusions

The objective of this paper was to highlight the ways in which researchers, particularly those of high-caliber name recognition, and the availability of new data have both hampered and instigated discussions of relationships between the Mimbres and Casas Grandes archaeological cultures as well as to evaluate historically-situated claims for a shared heritage between the two. This is because one main contention between those who see little to no relationship between the two cultures and those who see a direct, ancestral relationship rests upon a few supposedly unique, or rare, ceramic attributes identified in both ceramic traditions. These include the occurrence of the painting of human figures and figurative scenarios, the presence of human effigies in the form of hooded jars, the depiction of horned/feather serpents, the use of a similar vessel morphology, and the negative painting of figurative designs.

Results of this evaluation of published Mimbres and Casas Grandes vessels suggest that while observations for the presence of these attributes in both ceramic traditions are clearly valid, it is unclear how unique or diagnostic individual attributes can be considered. Several attributes are notably present in other ceramic traditions contemporaneous to both Mimbres and Casas Grandes, but it is probable that these iterations in other traditions represent post-hoc adoption. Additional debates such as population dynamics and mortuary patterns remain unresolved for future research. Nevertheless, the results of this assessment and a previous one suggest the existing data do warrant consideration by Mimbres and Casas Grandes scholars alike and, more broadly, a need for archaeologists to carefully but critically reevaluate untested received wisdom from past researchers.

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Peregrinations of the Horned and Feathered Serpent in the Greater Southwest

POLLY SCHAAFSMA

Everyone fantasizes about snakes. Archaeologists fantasize about their pictures—on pots, in rock art, or painted on kiva walls. Worldwide, many serpentine beings are portrayed with features not found among real snakes, and in the Greater Southwest, some of these creatures date back several thousand years (Farmer 2001). Imaginative snakes are numerous in the arts of the Greater Southwest, also known as the Northwest/Southwest (NW/SW) that in this discussion includes the American Southwest and northern Chihuahua. Some of these snakes are outfitted with horns, ears, feathers, and even arms, and it is not surprising that archaeologists hold many opinions as to what these represent. In this very brief overview, I maintain that the snakes and serpents depicted in the NW/SW are not all the same conceptual being, even those all gussied up with unnatural features. Rather, I am addressing a specific serpent—the one with a prominent snout and thick horn on its head, known today among Pueblo people as the Great Water Serpent. Head or body feathers may also add to its distinctive appearance and broadcast his liminal nature.

The Great Water Serpent that appears in the Greater Southwest after around A.D. 1000 is a distinctive character, and today among the Pueblo people he is known by various native appellations—*Avanyu* (Tewa), *Tsitsshrue* (Keres), *Skatowa* (Zia), *Wanakyndy'a* (Jemez), *Kolowisi* (Zuni), and *Palülükong* (Hopi)—names perhaps even more diverse than the understandings of who this is, his various powers, and what he does. Because there are so many opinions about his identity, he's hard to talk about without raising a ruckus and instigating impassioned discussions. While there is a female version among the Hopi (Stephen 1936:1026), the male aspect nevertheless dominates among general perceptions, so I will proceed on this note.

I argue that that the origins of the Great Water Serpent, the horned and feathered serpent in the north, lie in Quetzalcoatl of Mesoamerica, a complex multifaceted deity with whom he shares a similar suite of aspects. A feathered serpent is by nature a liminal being with command over the regimes of both earth and sky, exerting his broad powers and authority in multiple ways. Associated with movement and change, he incorporates the processes of both creation and destruction, followed by re-creation. His associations with water take on both terrestrial and celestial domains, with ties to wind, clouds, rain, lakes, and springs. In Mexico, a serpent deity delivering water promoting plant growth is portrayed in the murals of Teotihuacan between A.D. 600-750 (Berrin 1988:Plates A-F). Tied to these fundamental cosmological realms, he also was associated with the powers of leadership, merging man and god (Carrasco 2000; Gillespie 1989; Kowalski 2007; Kowalski and Kristan-Graham 2007). Cowgill (1992:104-105) proposes that the feathered serpent's association with rulership in central Mexico was truly ancient, even preceding Teotihuacan. The horned and feathered serpent of the NW/SW shares many of the attributes and the guises inherent in the Mexican serpent deity, several of which are touched on here (Schaafsma 2001). These complex relationships challenge the proposal that the Serpent of the NW/SW is derived from the serpent of the Southeastern United States, although a possible common origin for both is worthy of more investigation (e.g., Phillips et al. 2006).

Today in the north, his best-known associations are with water, although his other dimensions are revealed in oral traditions. He is said to reside in springs, and at Hopi it is said that springs are kept alive by their resident serpent deities. Further, you can create a spring by planting a small jar containing a horned serpent (Geertz and Lomatuway'ma 1987:178-79). In the Rio Grande valley, there are Taos stories about other Pueblos having kept a great snake to which, on occasion, they fed small children, so that he would not withhold the rain (Parsons 1940[1926]:171). It is said as well that he can also cause punitive floods and earthquakes against Pueblo communities when things become socially out of hand and religious practices ignored. Since earthquakes are exceedingly rare in the north, landslides take their place. Regarded as a fearsome being, this serpent is thought of as unpredictable, and Nequatewa explains that the Little Hopi War gods sit on him to keep him under control (Nequatewa 1947). At Zuni, a great flood brought about by this serpent is forever commemorated by the division between the white and red sandstone on the side of Dowa Yalanne, a mesa near the pueblo also known as Corn Mountain. This line is said to indicate the high water level of a flood that threatened to destroy the village on top, and it was brought down by the sacrifice of two children to the serpent. Alternatively, in his role as creator, via an effigy, he delivers items of essential value such as seeds and spring water, to the young initiates into the kachina society at Zuni (Wright 1985:Plate. 14). Woven together in the lengthy Hopi tale of Palotquopi, (also known as Palatpavi, the Red City of the South), as told by Edmund Nequatewa (1947), the themes of destruction and renewal are dramatized by acts of the village leader, the Water Serpent, and an icy star deity. In this narrative the star deity is thought to be the Water Serpent in another guise (e.g., Schaafsma 2000). Recently, Michael Kabotie and Delbridge Honanie in a highly symbolic mural uniting Hopi tradition and the current world, with reference to this story, portrayed the serpent "as the spirit of creativity and revelation that arises during times of social decay and chaos to address the male and female elements within each of us. The serpent will carry us into the numinous underworld and re-educate us to the responsible truths" (Lomawywesa and Coochsiwukioma 2010:189 and Figure 8.5).

In the Past: Horned (and Feathered) Serpents and their Archaeological Contexts

He has been around a while in the NW/SW, at least since his picture appeared on Classic Mimbres Black-on-white bowls sometime between A.D. 1000 and 1130. And he was here to stay. In the prehispanic graphic arts of the Pueblo north, this horned and feathered serpent appears probably sometime in the fourteenth century. He is almost everywhere, or at least his image is, and in regard to the past and as archaeologists, these depictions are all we have to go on. You will find him pecked and scratched on scattered boulders, on cliffs, or painted in hidden rocky nooks and crannies throughout the arid Southwestern landscapes from Paquimé to Taos. During or shortly after the fourteenth century, he appeared in the colorful and complex Pueblo IV (ca. A.D. 1325-1600) kiva murals in the Rio Grande valley where he is an active participant in scenes that denote his varied associations and meanings. Around six or seven hundred years ago as well, the horned serpent graced the slick surfaces of Ramos Polychrome pottery in the Casas Grandes region of northern Chihuahua. In this case his imagery is rampant.

In spite of the multidimensional character of this serpent, the consistency of his representations is remarkable. A prominent forward- reaching horn, a canine-like head with a prominent snout (often toothed), and a checkerboard or dot-in-square neckband are among his regular features. Other added graphic attributes reflect the particular aspect of this snake that the artist wanted to project, and as noted, this is a diverse being.

Continuity and Diversity. Mimbres bowls with the image of the Horned Serpent feature two of his aspects early on. There is a single Mimbres bowl on which his water associations are emphasized by means of his bifurcated fish-like tail and fins, along with the clouds decorating his body (Brody 1977:Figure 160). The relationship between the horned serpent and terrestrial water and even rain is one of his best known aspects today. Several other bowls portray ritual practitioners wearing horned serpent costumes in the act of beheading someone or carrying a "trophy" head (LeBlanc 1999:Figure 2.7). In these instances, there are no obvious allusions to water, and we do not know if what is portrayed here are scenes from oral narratives, or if they denote sacrificial acts or punishment for wrong-doing, or something else entirely, but in any case, the costumed beheader appears to be endowed with the powers of this serpent. A petroglyph near the Mimbres valley depicts a bearded man with the body of a rattlesnake. Above are a reptile and a macaw marked with an equilateral cross (Schaafsma 1992:Figure 79). Elsewhere in the El Paso area, a horned serpent's head is depicted along with masks and two large equilateral crosses. While rare in Jornada rock art, such crosses signify Venus as morning star that, in turn, has a warrior aspect, one that came into prominence in the prehispanic Pueblo north after ca. A.D. 1325 (see following).

Southeast of El Paso, painted in white against the soot-blackened ceiling of a rock enclosure, is a large serpent with cloud patterns on its body, a thick horn over which feathers fall, and a checkered necklace (Figure 1). This impressive figure is in close association with other large paintings of predatory animals, and the entire context suggests that at this site he may represent a cloud serpent with a parallel in Mixcoatl, the Cloud serpent of Mexico, a guise of Quetzalcoatl. As such he is a patron of the hunt and identified with the Milky Way (Miller and Taube 1993:115). In the Pueblo north, the creator role of the ethnographic horned serpent who delivers seeds and moisture is portrayed in Pueblo IV rock art. In the Galisteo Basin there is a petroglyph of a diving horned serpent, perhaps suggesting lightning, showing a corn plant growing upward from his mouth (Figure 2). Elsewhere, a Pueblo rock painting shows him spitting green plants and drops of water, reminiscent of his functions in the Zuni kachina initiations previously mentioned (Schaafsma 2020:Figure 5.5).

Throughout Mesoamerica and the NW/SW, springs are regarded as terrestrial sources of rain in which clouds originate, and, likewise, they are the abodes of rain-related deities such as this serpent (Schaafsma 2009). It follows that he is often pictured bearing rain clouds (Crotty 2007:Figure 6.14), or in contexts where his link to the watery Underworld is made explicit. At Pueblo Blanco (ca. A.D. 1325-1525), a petroglyph of a 28-foot-long serpent with a double cloud on its tail sweeps across a cliff under a shallow sandstone overhang (Figure 3a). Centered on the ledge above is a deep niche that receives rain run-off from the water-stained cliffs above. Likewise in Kiva III at Kuaua (ca. A.D. 1590-1610) (Vierra 1987:75), several large serpents, one with a cloud terrace on its rattlesnake tail, move horizontally toward the wall niche (Figure 3b). Two of these have rain drops falling from their bodies. While the plaster around the niche is fragmented on this layer, on subsequent layers, terraced clouds are painted emerging from this aperture. A similar symbolic arrangement was also painted on the wall of a mid-thirteenth century ritual room near Roswell, New Mexico (Schaafsma and Wiseman 1992), and on the wall of an historic room at Zuni (Stevenson 1904:Plate XXXVI). The horizontally disposed serpents with clouds on their tails at Pueblo Blanco and Kuaua suggest Quetzalcoatl's guise as Ehécatl in Mexico, the wind deity that brings rain clouds (Taube 2001).

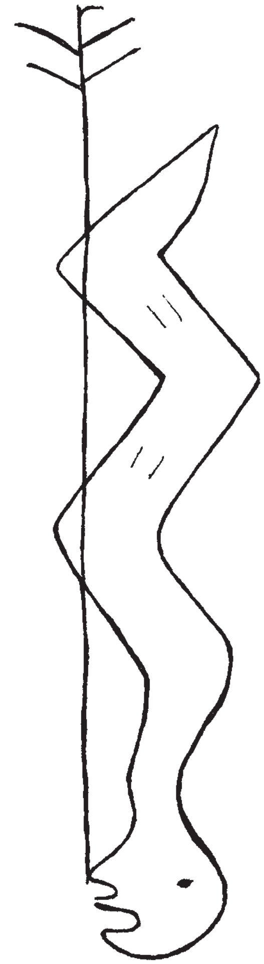


Figure 2. Upsidedown horned serpent with corn plant growing up from its mouth, Galisteo Basin, ca. A.D. 1325-1610.

Figure 1. Cloud serpent, horned and feathered, Jornada Rio Grande region, Texas. (Photograph by Curtis Schaafsma).

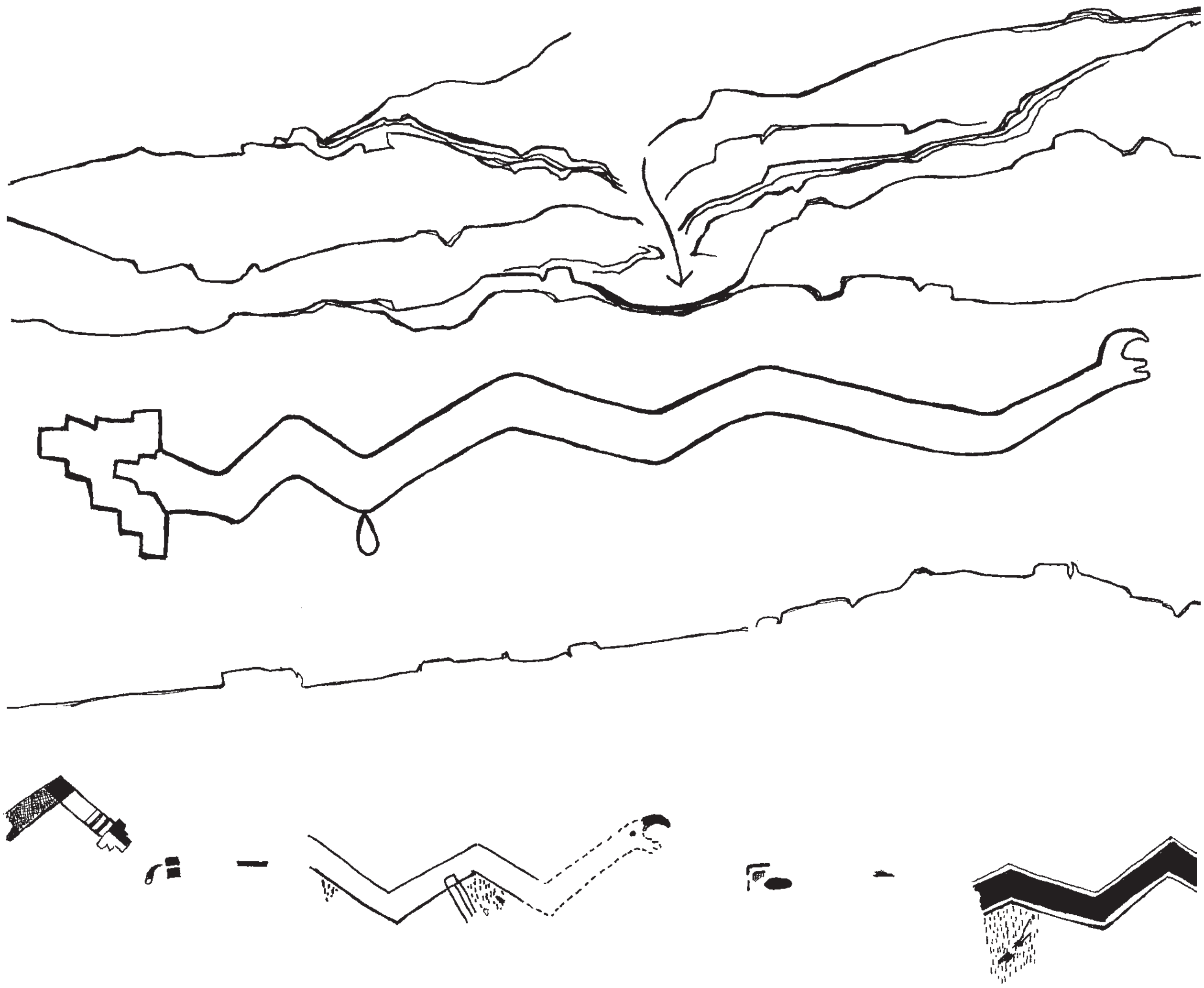
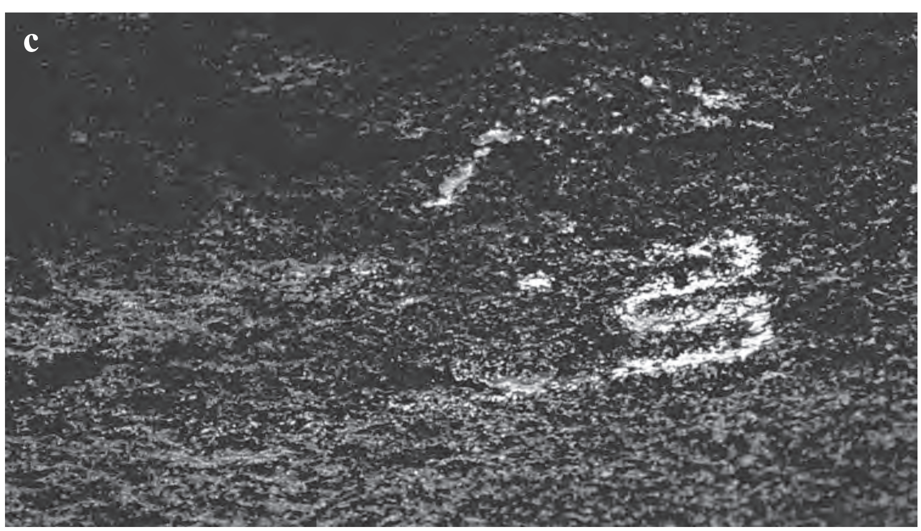


Figure 3. a) Horned and feathered serpent 28 feet in length, pecked beneath a sandstone niche or hollow that collects runoff from above during rainstorms, Galisteo Basin (ca. A.D. 1325-1525). Arrow designates path of runoff. b) Horned Serpents painted in conjunction with kiva niche (center right), Kiva III, layer I-33, Kuaua Pueblo, between ca. A.D. 1580-1610 (after Dutton 1963:Plate XIII). (Drawings by author).

A third and vastly more complicated example of this symbolic complex involves a distant spring and the Mound of the Serpent at Paquimé (Figure 4a-c). The serpent mound includes a large boulder incised with a flowing rendition of a fork-tailed, feathered serpent (Di Peso et al 1974:5:Figure 2-5). The zigzag mound points to distant cliffs inscribed with four horned serpents among other petroglyphs above a large spring. If, as proposed here (see following), the Horned Serpent sanctified rulership at Paquimé, the serpent mound would have functioned as a vital and direct visual link between the urban center and the sacred landscape at Arroyo de los Monos where the spring is located, endowing the leadership with the power to control water sources, including rainfall, and accordingly, community well-being (Schaafsma 1998:41, 2018). Horned serpent representations occur near at least two other known springs in the vicinity of Paquimé (Jeffrey Romney, personal communication, 2020).


a

Figure 4. Horned serpent/spring complex at Paquimé, Chihuahua (ca. A.D. 1300-1450). Page 232, a) Serpent mound at Paquimé pointing to cliffs above the spring in Arroyo de los Monos in the distance. Above, b) Spring at Arroyo de los Monos; below, c) one of several horned serpent petroglyphs above the spring. (Photographs by author).



In summary, the horned serpent's relationships to terrestrial water sources and rain as these examples indicate, is long-standing and widely distributed in the NW/SW as well as in Mesoamerica.

The Horned Serpent and the Morning Star. Beyond his broad powers as a water serpent, the archaeological record in the NW/SW offers additional evidence of other prominent roles for the horned serpent, specific to particular places and restricted in time. A link to the Morning Star, while suggestive elsewhere in the north became fully developed among the Rio Grande Pueblos during Pueblo IV times. Postclassic Mexican sources explain the relationships between the black-faced stars in Pueblo art and rattlesnakes pictured in the Pottery Mound murals and in central Rio Grande rock art, the details of which are explored at length elsewhere (Mathiowetz et al. 2015). As a star-related being, another guise of Quetzalcoatl is Tlahuizcalpantecuhtli, Lord of the Dawn, a Postclassic militarized and dangerous aspect identified with Venus, a bellicose morning star that shoots forth lethal rays. A consortium of black-faced deities, including Itztlacoliuhqui-Ixquimilli, related to cold and castigation, is part of this Mexican complex (Mathiowetz et al: 2015; Miller and Taube 1993:166; Schaafsma 2000, 2005).

Represented in Pueblo IV rock art throughout the Rio Grande valley, the serpent/morning star complex is most fully developed in the Southern Tewa, or Tano region and southern Tiwa provinces that includes Pottery Mound and its murals (ca. A.D. 1340-1500). Here the star itself may be elaborated with projectiles, visual references to "lethal rays," eagle feathers, and talons, the last of which denote this star as a scalper. The Pottery Mound murals further detail and contextualize the horned serpent's warrior aspects. Particularly noteworthy is the portrayal of the horned serpent and the black-faced Morning Star in Pottery Mound's Kiva 7 (Figure 5). In this case and other Pottery Mound examples this figure has a sinister-looking down-turned red mouth with teeth. In addition, war-related rattlesnake and/or Morning Star iconography is depicted on at least nine painted layers of Kiva 8, while it is much less common in other kivas. This iconographic clustering in Kiva 8 raises the question as to whether the horned rattlesnake serpent was regarded as a "patron" of a warrior society at Pottery Mound associated with this kiva. In the recent past, having taken a scalp was a prerequisite for membership in nearly all Pueblo warrior societies (Schaafsma 2000:181).

These representations comprise an integrated packet of symbols relating to an ideology of Pueblo warfare, in which the acquisition of enemy scalps as rain fetishes was a desired outcome (Schaafsma 2000:144-154, 2005). There are few Pueblo narratives today, however, that account for the horned serpent as such, in this group of

Figure 5. Horned and feathered serpent superimposed by Morning Star being, Pottery Mound, ca. A.D. 1340-1500, Kiva 7, Layer 9. (After Hibben 1975:Figure 34).

relationships, although remnants of earlier and more robust associations between snake warriors, stars, scalps, and rain-making rites are cited in early ethnographic references (Parsons 1940[1926]:1, 1939:926-27; Stephen 1936; Stevenson 1904; and Voth 1903:334 among others). Detailed discussion of this topic can be found elsewhere (Mathiowetz et al. 2015; Schaafsma 2000). By the late 1800s, warrior societies had largely shifted their focus from conflicts and hostile engagements to protective community duties (Schaafsma 2000).

The Horned Serpent and Leadership at Paquimé. Another focus of the serpent deity in the NW/SW is the Casas Grandes region of northern Chihuahua where iconographic evidence indicates it had a critical integrative sociopolitical role. The visual link between the Mound of the Serpent at Paquimé and the large spring in Arroyo de los Monos where four horned serpent petroglyphs are located was previously described and leadership ties to landscape powers are suggested by these relationships. In addition, the prolific display of standardized Horned Serpent heads on Late Medio period Ramos Polychrome ceramics between ca. A.D. 1300-1450 (Whalen and Minnis 2012), serve as further indications that the serpent deity held sociopolitical functions and an identity with leadership in the Casas Grandes world. Further, sociopolitical models backed by a Quetzalcoatl cult in Postclassic Mesoamerica support this suggestion (Ringle et al. 1998). What follows is a brief synthesis of this issue.

The horned and feathered serpent on Ramos Polychrome may be represented as an entire serpent or symbolized by standardized variations of the head, the latter being nearly ubiquitous. The whole snake may wear a broad checkerboard or dot-in-square neckband and have two horns or feathers that fall or curve outward from the top of the head (Di Peso et al. 1974:6, Figure 290-6 [26]), the precise identification of these projections being ambiguous. The dot-in-square pattern is widespread throughout the Americas and often symbolizes maize and, depending on the context, elite status or both (Webster et al. 2006). His snout may be toothed, and the tail bifurcated and fish-like. The body is commonly marked by contiguous large circles with an interior dot or, more rarely, with hatched triangular fields. These patterns also occur independently on Ramos Polychrome, and it is proposed that in any context, they symbolize this serpent (VanPool 2003). From the Mound of the Offerings, a large burial olla painted with this motif contained the post-cranial remains thought to be those of an elite ancestor. In this case, the circle design zigzagging across the burial vessel strongly indicates a connection between the Casas Grandes elite and the serpent (Ravesloot 1988; VanPool 2003:711), a relationship that adds support to the proposal that Casas Grandes was founded by members of a Quetzalcoatl sect. A small horned serpent head icon is included on this vessel as well.

On Ramos Polychrome, representations of the horned serpent's head are much more common than those of the entire snake (Figure 6a-g). Based on the popular misconception that the horned serpent heads represent macaws, however, the significance of the horned serpent in the Casas Grandes world has not been addressed, and the macaw has been given precedence. It has been nearly 90 years since Carey (1931:353) offered comments on the serpent's head and its short-cuts on Ramos Polychrome. First referring to this motif as a "small leaf", he immediately relabeled it as a "macaw" and this interpretation has been overwhelmingly accepted ever since (Di Peso et al. 1974:6:99; VanPool and VanPool 2007:Figure 3.3; see also Powell 2006:Figures 2.1, 2.4, 2.10, Plates 14-17; Ravesloot 1988:72; Sprehn 2006; Stuhr 2002; VanPool and VanPool 2018:148-151). Macaws, however, are easily distinguished from serpents by their lower beak that undercuts the upper beak, leaving no doubt as to their identity (Figure 6). In contrast, the serpent has a prominent snout.

Representations of heads as independent icons are uncommon in the NW/SW before around A.D.

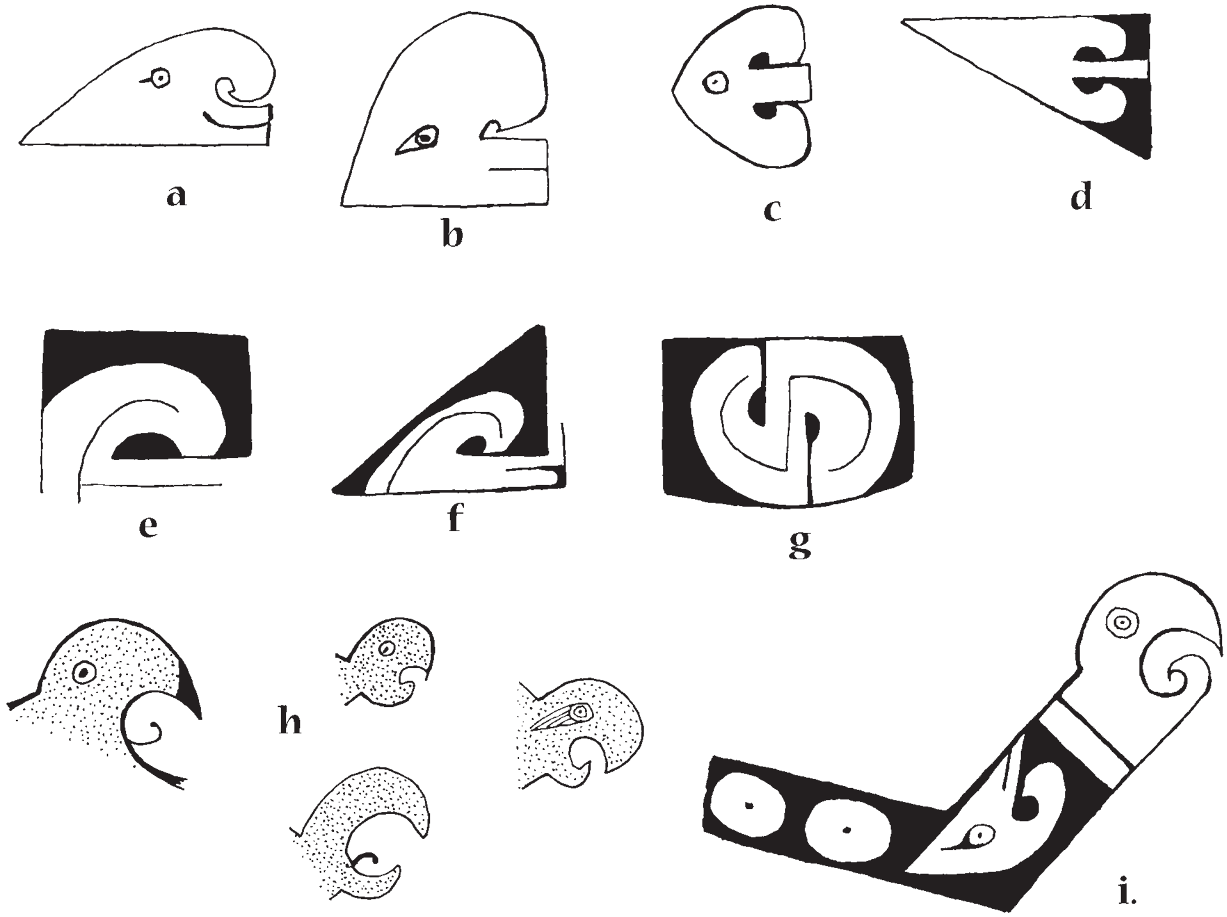


Figure 6. Selected serpent and macaw heads on Ramos Polychrome. a-g) Horned serpent head icons and abstractions thereof; h) macaw heads; i) a macaw/serpent synthesis. The macaw-headed serpent body is marked with an iconic serpent head and serpent body symbolism consisting of large circles with central dots. Images a-h after Di Peso et al. 1974:6:Figure 6-292; i: Amerind Foundation, Inc., Dragoon, Arizona, #1335). (Drawings by author).

1200 and, as proposed elsewhere (Schaafsma and Schaafsma 2019), these iconic serpent heads in the north appear to have been a graphic strategy derived from the Postclassic international style in Mexico as a means of condensing information and thereby facilitating communication (e. g. Boone and Smith 2003:Figures 24.5 and 25.6). Following the revised identification of these icons as heads of horned serpents as opposed to macaws, their frequency and significance on Ramos Polychrome demands further consideration. A count of macaw/parrot icons and horned serpent heads depicted within a small sample of Ramos Polychrome designs (Di Peso, et al. 1974:6:263-276) revealed that out of a total of 168 images, 89 percent represented horned serpents, as opposed to 11 percent that represented macaws. Stylized renderings of the serpent's head with its squared snout resemble those in the petroglyphs. In addition, the serpent's head may sport a feather fan spreading backward from behind the horn. With or without the added feathers, this motif commonly functioned as "filler", tucked into available spaces between other designs, and thus its omnipresence. Overall, the horned serpent's head is so frequent on Ramos Polychrome pottery that it could be perceived as a "logo" for Paquimé. This iconic figure also commonly occurs in pairs. Paired representations are consistent with other dual patterning on this pottery, and VanPool and VanPool (2002) suggest that dualism has possible roots in the underlying social structure and cosmology at Casas Grandes.

In addition to the stylized, standardized, but representational heads (Figure 6a and b) are those that are further reduced and abstracted, hence their tendency to go unrecognized today although their meaning would have been clear to members of the Casas Grandes population. Prevalent artistic conventions are the conflated horned serpent heads sharing a snout, an icon that is sometimes referenced as a "spade motif" Figure 6c and d). Single horned serpent heads may be further abstracted and referred to as D-shaped, "P" shaped, or "club-shape motifs (Sprehn 2006:Figure 2.5), all with ascribed roots in the macaw (see Di Peso et al. 1974:6:292). They are, nevertheless, the horns and snouts of abstracted Horned Serpents (Figure 6e-g). The Horned Serpent iconography bordering a male human figure on the jar in Figure 7a and b synthesizes a horned serpent head with this "D" or "P"- shaped abstraction.

There are, in addition, a few notable images on Ramos Polychrome jars of persons represented in full, with either the head of a macaw or wearing a horned serpent headdress (Figure 8 a and b). Those with the macaw symbolism are identified as a solar deity (Mathiowetz 2018), or alternatively as shaman-priests (VanPool 2003; VanPool and VanPool 2007). It is possible that persons associated with both the horned serpent and the macaw held leadership roles in varied contexts at Paquimé, thus accounting for the macaw depictions. Supporting this proposal are the rare instances of macaws and horned serpent conflations in which macaw heads may be pictured with serpent bodies (Figure 6i). Such syntheses may be regarded as illustrating their combined powers, thus contributing to the idea of a dual leadership, but due to their differences in numbers, in differing capacities.

Acknowledging the unusual and unprecedented prolific display of horned serpents on Ramos Polychrome widens the field of investigation and raises new questions pertaining to the Casas Grandes enterprise (Schaafsma 2018). Grounded in ancient ideology, the Feathered Serpent's tie to rulership was fully enacted following the end

Figure 7. Ramos polychrome jar with horned and feathered serpent with "D-motif" stylization. (Private collection; drawing by author).

Figure 8. Ritual figures on Ramos Polychrome ollas. a) Naked figure marked with pound signs and circles with central dots, wearing a horned serpent headdress (after Centennial Museum, El Paso, TX); b) Costumed person seemingly transforming into a macaw. Here the macaw motif on the head appears to be growing out of the human head and is not a "headdress' as such. Elsewhere feathers sprout around the arms suggesting that the figure portrayed is in the process of transformation. (Ledwedge Collection, Museum of Indian Arts and Culture, Santa Fe, MIAC/LAB 20679/11.) (Drawings by author).

of the Classic period in Mesoamerica when the founding of Quetzalcoatl cult centers and hence "place-making" was prevalent across a balkanized Postclassic Mesoamerica starting around A.D. 700-950 and lasting through Postclassic (Ringle et al. 1998). Predicated on this model, it is proposed that the horned serpent was the political/religious motivating and integrative force behind the seemingly enigmatic rise and efflorescence of the Late Medio period of Casas Grandes centered at Paquimé around A.D. 1300. If this ideological framework was in some form operative at Paquimé as the data suggest, this northern community would have been a hinterlands version of such a center, modeled on more complex urban centers in Mexico, possibly introduced by immigrants from the south in cooperation with local people. Indications of an immigrant population are supported by dental studies that relate both Mimbres and Casas Grandes people to Sinaloa (Turner 1999). Among other items, shell and copper artifacts are testimony to extensive trade contacts between Casas Grandes and the West Coast societies that were, in turn, recipients of ideologies from central Mexico (Mathiowetz et al. 2015).

There is other supporting evidence for this proposal. I-shaped Mesoamerican style ball courts with fundamentally a north-south orientation at Paquimé are characteristic features of Quetzalcoatl centers further south in Mexico. Platform mounds and a complex water control system that included a man-made reservoir with offerings consistent with symbolism related to Mesoamerican water cosmology (Schaafsma 1999; Schaafsma and

Taube 2006), are additional features that point to Paquimé as the center of a complex political system with Mesoamerican features. Large agave roasting pits adjacent to the ceremonial center indicate that Paquimé was a pilgrimage destination as well. Most meaningful perhaps is the Mound of the Serpent described earlier that takes on additional significance within this model as a means of integrating the leadership of Paquimé with the beneficent and creative powers latent in the spring and the resident horned serpent deity pictured above it.

Within such a scenario, Ramos Polychrome pottery may have played a critical role. On a broad front in Mexico, high quality polychrome ceramics were used to promote the ideology at stake and legitimize elite political power (Ringle et al. 1998). Suggestive in granting Ramos Polychrome similar cult association status is its refined nature and the high quality of is decoration which surpasses that of other pottery types in the NW/SW, a region already known for its pottery production. Comprising 68.7 percent of the Chihuahuan Polychromes found at Paquimé, Ramos was ubiquitous, occurring in all contexts throughout the site and not limited to ritual space (Rakita and Cruz 2015:62). Having a widespread and constant presence within the urban center and in neighboring communities on a daily basis as a household phenomenon, the iconography would have functioned to reinforce community and a "state" identity and promote leadership that was, in turn, perceived as sanctified by this deity. The long and wide, sloping upper surfaces on Ramos Polychrome ollas provided a suitable field for displaying iconography appropriate to these ends.

In sum, it is suggested that the condensed and standardized symbol system enabled the promotion of social unification and identity under the political guise of the horned and feathered serpent in the Casas Grandes sphere. Because the prevalence of horned serpent imagery has gone unrecognized since investigations of the Casas Grandes region began, its significance to the socio-religious/ political order at Paquimé has never been addressed. Nevertheless the plethora of serpent icons would have functioned to promote the religious/political ideology and associated social identity, and legitimize the leadership at Paquimé. When Paquimé ended, Ramos Polychrome with its suggested promotional program of Horned Serpent symbolism vanished as well (Whalen and Minnis 2012). It seems likely that an explanation for Casas Grandes society, as the saying goes, "has been hiding in plain sight."

Conclusion

A complicated and enduring deity, the Great Water Serpent constitutes a personage with a diversity of powers fitting for a "great god" in any pantheon. Such a status explains his multi-vocal presence in the NW/SW and in his various guises as the Feathered Serpent in Mesoamerica. Peripheral to civilizations of Mesoamerica, the northern farming communities were impacted by the spreading Mesoamerican cosmologies during the Postclassic era, appropriating their deities in useful ways. Via his depictions, we find that the Feathered Serpent deity from the south assumed similar roles in the north, where it was adapted to local needs and circumstances. In the arid NW/SW, the need for rain and means of coercing the supernatural powers to provide the moisture critical to a successful growing season has always been a paramount concern. It is not surprising that the serpent's links to water and well-being are consistent throughout Mexico and the NW/SW alike, including Paquimé. The Pueblos' appropriation of the serpent's aspect as a militant star-being, parallel with the attributes of Tlahuizcalpantecutli, the Morning Star aspect of Quetzalcoatl in Mexico, begs a further examination of its potential social role in addition to its symbolic meaning among the Rio Grande Pueblos during the Pueblo IV period. This phase of the horned serpent deity in the north appears to stand in contrast to both his rain-related powers and his leadership functions in the Casas Grandes region for a limited period of time.

This paper presents only a sweeping glimpse of this complex deity, quickly summarizing some of this serpent's varied aspects. Much more in-depth discussions can be found elsewhere as cited above. Beyond specific roles, as described earlier, fundamental to this serpent's on-going significance are its inherent contradictions embraced within its powers of destruction and devastation coupled with regeneration and creation (e.g., Lomawywesa and Coochsiwukioma 2010:182 and Figure 8.5). As an overseer of Pueblo morality as expressed in contemporary Pueblo narratives, he retains, perhaps, a fragment of his political/religious leadership functions of the past.

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Coronado in Perspective: Reflections on the Past 35 Years of Investigation, 1985-2020

MATTHEW F. SCHMADER AND BRADLEY J. VIERRA

Over 480 years ago, one of the largest and most impactful expeditions (*entradas*) ever organized by the Spanish crown in its colonization of the western hemisphere departed from the west coast of present-day Mexico. In late February of 1540, a huge assembly of administrators, tradesmen, soldiers, clerics, investors, and associated household entourages of servants and porters gathered with uncounted numbers of women and native Mexican warriors to begin its march northward. Nearly 400 Europeans, an estimated 2,000 indigenous Mexican soldiers (*indios amigos*), an unrecorded number of support people, along with 1,100 horses and thousands of head of livestock left Compostela (near present-day Puerto Vallarta), the provincial capital of Nueva Galícia. The exploration had been sanctioned by King Carlos I of Spain—also known as Charles the Fifth, the Holy Roman Emperor—one of the most powerful people in the world at the time. License to conduct the expedition had been granted to Antonio de Mendoza, the Viceroy of Nueva España (or New Spain, now Mexico). Mendoza's choice to lead the expedition was a trusted friend of his family, the 27- or 28-year-old governor of Nueva Galicia, *capitán generál* Francisco Vázquez de Coronado y Luxán.

The goal of the Mendoza enterprise was to find the best and most direct land route to Asia, with specific hopes of going to China. The real purpose was to establish diplomatic and trade relations with Asian polities (Flint and Flint 2019), which would greatly enhance Spain's standing in competitive and rapidly expanding global exploration during the Age of Discovery. An earlier reconnaissance led by Fray Marcos de Niza in 1539 had located large settlements a reachable distance to the north and northwest of Nueva España in an area known as Cíbola (the vicinity of present-day Zuni Pueblo). The Mendoza expedition to "*La Tierra Nueva*" would last almost two and one-half years and cover nearly 7,400 km (about 4,600 mi). Although royally sanctioned, the enterprise was privately funded and each of the European participants was essentially an investor in the scheme. The total value of the undertaking was equal to 19 tons of silver (S. Flint 2003:52), an astronomical amount for the time, and many personal fortunes and incomes were staked against a hopefully lucrative outcome.

The complex expedition split into advance parties and following supply lines as it made its way through northern Mexico and across the Sonoran Desert by early summer of 1540. The arrival at the Zuni pueblo of Hawikku in Cíbola was an immense letdown because the goal of Asia had not been realized; making matters worse was the state of hunger and exhaustion of the exploratory party. In turn, Zunis had long known about and been prepared for the expedition and feared reprisals over their killing of Esteban, de Niza's North African guide, the year before. Any possibility of peaceful negotiations quickly broke down and the first battle between Pueblo peoples of the North American Southwest and foreign outsiders took place on July 7, 1540 (Damp 2005). The resulting hard-fought battle was short, and Coronado's force succeeded in overwhelming the defenders of Hawikku pueblo.

In the aftermath, the expedition took most of the available food and supplies from the village while the Zuni survivors secluded themselves at more defendable sites on nearby mesatops.

The Tiguex Province

After Coronado's first encounter with the major Pueblo villages at Zuni and the realization that he had not arrived at the doorstep to Asia, he was faced with going forward or returning to Nueva España. Advance geographic intelligence had suggested continuing to the northwest, but new evidence gathered from scouts advised that there were no settled lands in that direction. Instead, he was told, there were major settlements to the east. Coronado deployed his young captain of the artillery, Hernando de Alvarado, to lead an exploratory group eastward and in September of 1540, Alvarado became the first non-native person to describe the Río Grande valley:

> This Río de Nuestra Señora flows through a very wide, level, and fertile land planted with cornfields. There are some groves of cottonwoods. There are twelve towns. The houses are made of earth and have two terraced stories. (Flint and Flint 2005:304-305).

Alvarado's words were the first written description about the area, and as such constitute some of the earliest recorded documentary history in the North American Southwest. His description was of an area that Coronado and his chroniclers would soon call "*la provincia de Tiguex*," or the Tiguex province. At the time, provincias were regarded as territories that had unified customs and peoples. The word "Tiguex" was close to what the Spanish heard as the indigenous word for "we, us, ourselves" in the Tiwa language. Today we recognize the Tiguex province as the homeland of the Southern Tiwa-speaking pueblos, principally those of Sandia and Isleta. The province extends, at a minimum, some 25 mi (40 km) along both sides of the Río Grande from Kuaua/Coronado Historic Site near Bernalillo on the north, to Isleta pueblo on the south (Figure 1).

The Coronado expedition has as both a strength and a drawback the fact that many associated documents have been found and translated since they were written in the sixteenth century. The extensive written record that still exists provides many tantalizing clues as to the nature and whereabouts of various described places and events, and at the same time is so full of ambiguities that it has created innumerable and elusive leads, many unresolved even to this day. Coupled with that, there are many documents which are simply missing or have vanished over the centuries and are now only known by passing reference. We know, for instance, that the expedition had an illustrator and a cartographer, but no drawings or maps have ever been found. The uneven nature of descriptions in the documents can be quite frustrating as well. Many details such as physical landmarks or the kinds of objects used in daily activities are absent, and there is almost no mention of the many hundreds of *indios amigos* (Mexican soldiers) who did the bulk of the expeditionary fighting. Women are almost completely invisible in the written record, and there is no discussion of the vital work done by the women who made all the food (*tortilleras*), or of people who tended the animals or carried the burdens (see Flint and Flint 2019 for a detailed discussion of these topics). Yet, without these unmentioned individuals, the whole enterprise could not have functioned.

Another complication is the lag time between events described in some accounts, and when those accounts were written. Some documents, such as correspondence between Coronado and Mendoza or King Carlos I, are nearly contemporary. An entire set of documents relating to the eventual trial of both Vázquez de Coronado and his *maestre de campo* (field general) captain García López de

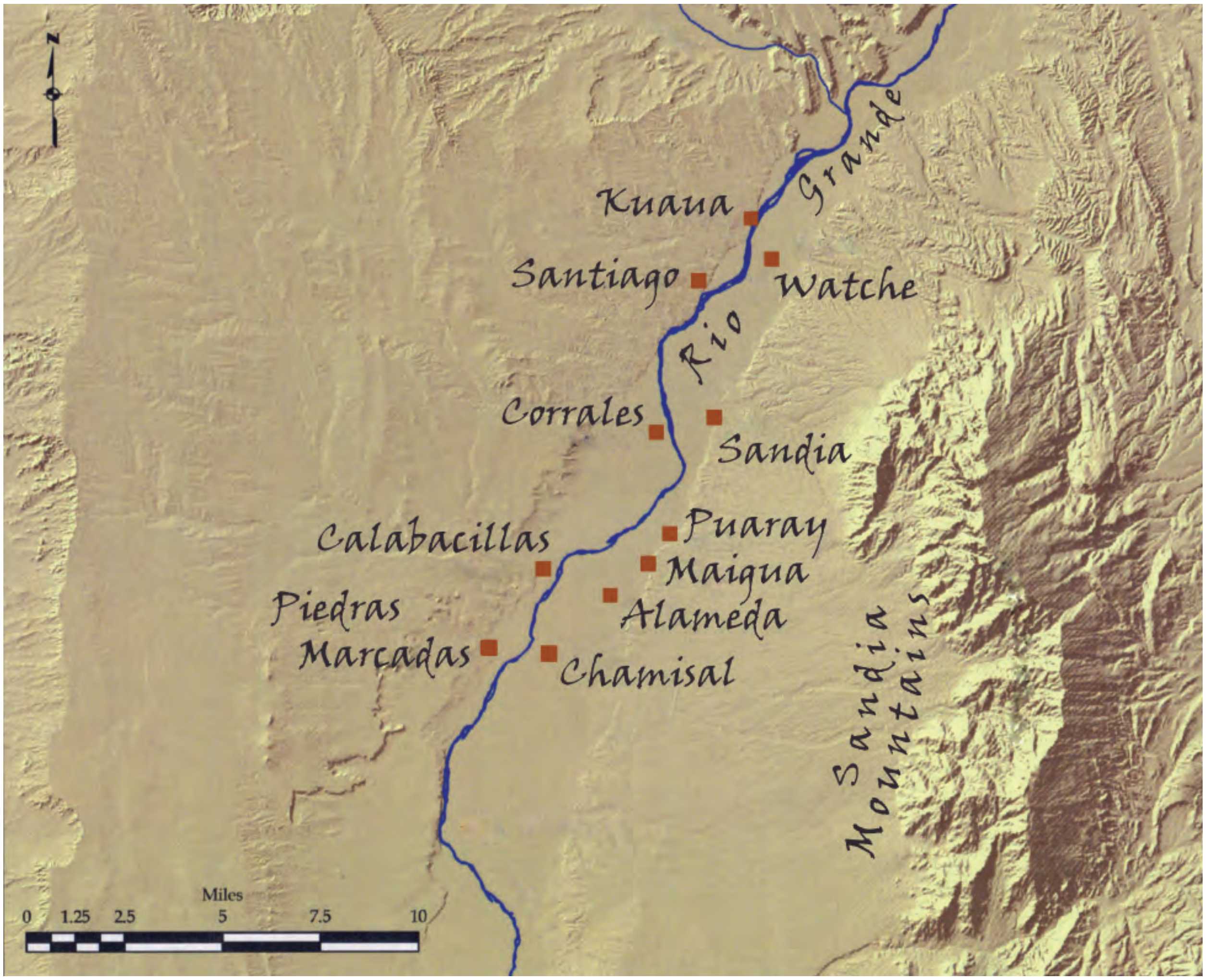

Figure 1. Map of the Tiguex Province showing most of the Tiwa towns from Bernalillo to northern Albuquerque (Isleta pueblo is beyond the southern extent of the map). Map by M. Schmader.

Cárdenas, was written just several years after the expedition and contains answers from witnesses recalling fairly recent events (R. Flint 2002). But the primary descriptive chronicle of the expedition, which is full of descriptions and a running narrative account of the whole undertaking, was written fully 20 years after the fact by Pedro de Castañeda de Nájera (Flint and Flint 2005; Hammond and Rey 1940; Winship 1896). While Castañeda's account can be scrutinized as a memory document not written in real time and thus requiring some circumspection, it still has more extensive detail and useful information on many topics than virtually any document produced by the expedition. Suffice it to say that the written record is both quite profound and quite variable in terms of quality and reliability, and yet it is the extant record with which historians and archaeologists have had to grapple over a very long time. Only new documentary discoveries can or will change that fact.

Brief Overview of Coronado Research

Hernando de Alvarado's description of the Tiguex province stated that there were 12 towns, while other expeditionary documents suggest as many as 16 or more existed in the general area. Partly these differences come from what one observer or another might have regarded as a "town," and partly from the geographic extent of their descriptions (for instance, one person might have been looking along the river and another might have included the Sandia Mountains). Either way, the number 12 has been generally used as the quantity of settlements on both sides of the Rio Grande in the southern Tiwa or Tiguex province at the time of first European contact. Archaeologists and historians have been on a quest to find these villages at least since Adolf F. Bandelier (1892) worked in the vicinity in the 1880s. Much of the earlier investigative work, in fact, was done by historians who attempted to match place names and physical locations to make better sense of the Coronado documents. Other historical investigations include those by George Parker Winship (1896) and J. Lloyd Meacham (1926). R. Gordon Vivian's (1932) master's thesis from the University of New Mexico (UNM) was an updated examination of the Tiguex province based on documents from several sixteenth century *entradas*.

The first real archaeological surveys were carried out by Reginald G. Fisher (1931) in the late 1920s. Fisher was able to find most of the larger Contact period villages in the Tiguex province (see Figure 1), including Kuaua (LA 187), Santiago (LA 326), Piedras Marcadas (LA 290) and Alameda (LA 421). Harry P. Mera (1933) subsequently came through the Rio Grande valley in the early 1930s and made limited ceramic collections along with some of the first sketch maps of the larger pueblo sites.

With the upcoming Vázquez de Coronado *cuartocentennario* (400-year anniversary) in 1940, Edgar Lee Hewett, the founder of the University of New Mexico's Anthropology Department, initiated a series of projects in the middle Rio Grande valley during the 1930s. These investigations included work at both Kuaua (Tichy 1935) and Santiago pueblos (Tichy 1939, Vivian 1934). Hewett was determined to find physical evidence of Coronado and ironically succeeded in getting Kuaua set aside as Coronado State Monument even though very little (if any) Contact-period material was found there (Brody 2009). The irony arises from the fact that Hewett's own graduate student, Marjorie Tichy (later Lambert) was laboratory director at Santiago Pueblo (LA 326), just a mile south of Kuaua. Tichy, Fisher, and Vivian all worked at Santiago and found Contact-period materials there, so it would have made better sense to attach Coronado's name to that site. But the finds of spectacular kiva mural paintings at Kuaua in the years before the *centennario* (Vivian 1935) sealed that site's prominence despite less direct association with the Coronado expedition.

A major milestone was the comprehensive translation of expeditionary documents from sixteenth century Spanish into English by historians George Hammond and Agapito Rey (1940) as part of UNM's *cuartocentennario* project. The prominent historian Eugene Bolton (University of California at Berkeley) then wrote the account *Coronado: Knight of the Plains* (1949), which for decades served as the main source of information about the expedition and for much of the more or less "mythic" information that became popular knowledge. Those assumptions included or reinforced notions that the exploration was a search motivated to find gold (or the "Seven Cities of Gold"); that the expedition was a well-supplied assembly of European soldiers; and that Coronado's treatment of native peoples was relatively mild, even exemplary.

The decades from the 1940s into the mid-1980s saw little progress in finding actual physical evidence of Coronado-period material. An exception was a brief *El Palacio* article written by Bruce Ellis (1957), which featured a photograph of several copper crossbow arrow points (Figure 2). Despite Ellis' acknowledgement that Coronado had been in the Rio Grande valley, no real initiatives were taken to continue any physical search for associated sites. Related work included David Snow's (1975) important identification of Puaray pueblo at LA 717 and Carroll Riley's (1981) revised overview of

Figure 2. Copper crossbow boltheads recovered from Santiago Pueblo (LA 326), illustrated in Ellis' (1957) El Palacio article. (Courtesy the Palace of the Governors, Museum of New Mexico).

Coronado's Tiguex province.

It was not until the late 1980s that renewed interest emerged with the work of historians Richard and Shirley Flint. Richard Flint's (1992) thesis on the probable materials associated with Coronado sites laid the groundwork for the next 30 years' worth of documentary and scholarly research. The Flints acted as catalysts to bring together historians, geographers, archeologists, and a wide net of others interested in following various parts of Coronado's route (Flint and Flint 1997, 2003, 2011). Importantly, they were not content with past translations of documents and completely reworked the 1940 efforts of Hammond and Rey. Their new translations (Flint and Flint 2005) and discoveries of additional related documents produced a clearer picture of the expedition and created more leads to follow, a process that is still continuing (see for example, Flint and Flint 2019).

Archaeology lagged behind the advances in historical research but began to catch up. Three major developments have contributed to a new round of recent research and discovery. First, the involvement of and consultations with tribes and native consultants has resulted in more focused and culturally sensible field investigations (Schmader 2016a). Archaeologists no longer work at places or on events important to indigenous history or patrimony without seeking an understanding of what that work means to tribes and without sharing their results. Second, the general acceptance of metal detection surveys as scientifically legitimate procedures opened the door to discovering the first metal artifacts brought into the North American Southwest by sixteenth century European explorers. Third, as a result of metal detection work and other field projects along with input from historians, the recognition criteria for sixteenth century Contact-period sites and artifact assemblages has improved significantly. Understandings of what items look like, dates to which they can be assigned, and which artifacts tend to be found together have all moved forward.

In 2005, field work and metal detection at the Zuni pueblo of Hawikku found the first undisputable evidence of Coronado since the 1980s (Damp 2005). Soon after, research at Piedras Marcadas pueblo (LA 290) in the Rio Grande valley would add significant material to the growing assemblage of Coronado materials (Schmader 2011, 2014, 2016b, 2019). Other finds from the Rio Grande pueblos of Santiago and Kuaua (Mathers 2020), along with localities such as El Morro, Pecos, Pottery Mound (LA 416), Sevilleta (LA 721) and along the Arizona-New Mexico border continue to fill out the exploration's route. However, all of these archaeological advances turned on and built from the pivotal work led by Brad Vierra (1989) at a highly important location in the Rio Grande valley that came to be called the Coronado Campsite (LA 54147). Vierra recalls his work at the site:

The Coronado Campsite

Bradley J. Vierra

It was a nice day when Helene Warren was driving down NM 528 near Rio Rancho. The New Mexico Highway Department was widening the road and had recently leveled areas adjacent to the pavement. Warren observed something that seemed strange and decided to stop and take a closer look. What she found was a large area of scattered broken pieces of pottery with charcoal-stained areas that had previously been buried under the sand dunes. Archaeologists at the Highway Department and Museum of New Mexico came in to evaluate the situation and soon data recovery operations were commenced. Little did they realize the importance of what they had encountered.

The site was situated just west of a pueblo known as "Bandelier's Puaray" or Santiago Pueblo (LA 326). The surface pottery appeared to date to the same period as this occupation. So, it seemed likely that the site was in some way associated with the pueblo. It could have been some sort of processing site, a trash dump, or maybe even an Apache encampment that was occupied while trading with the pueblo's inhabitants. Excavations soon revealed unusual archaeological remains that seemed unlike any of these possibilities. The site was registered as Laboratory of Anthropology number 54147.

Grading had exposed at least 13 charcoal-stained features, hearths, and postholes. The surface was littered with sherds predominately distributed around the charcoal-stained features and in several clusters situated to the north of these features. This encompassed an area about 100 m north-south along the eastern side of New Mexico State Highway 528. In addition, one charcoal-stained feature was also identified on the west side of the highway in the far northwest corner of the site (Figure 3), producing a total site area of about 200 m north-south and 130 m east-west within the right-of-way (Vierra 1989; Vierra and Hordes 1997).

Excavations focused on the charcoal-stained features that turned out to be simple, shallow, dugout structures designated as "rooms." Work proceeded on Rooms 1 to 4, exposed by the grader in the southern area of the site, then shifted north to Rooms 5 to 7, then Rooms 8 to 10, and lastly Room 11 on the west side of the road. Rooms 12 to 14 were only partially exposed, and the sandy overburden needed to be removed to expose these mostly buried and fully intact features. Excavations revealed a range in sizes and shapes to these features. All appeared to be filled with charcoal-stained soil containing various artifacts, plant, and faunal remains. In each case, once the fill was removed an unprepared floor and sides of a shallow dugout were exposed. Simple burned pit hearths were present in many of the structures and some were bounded by postholes indicating the presence of a superstructure (that is, a tent or brush structure).

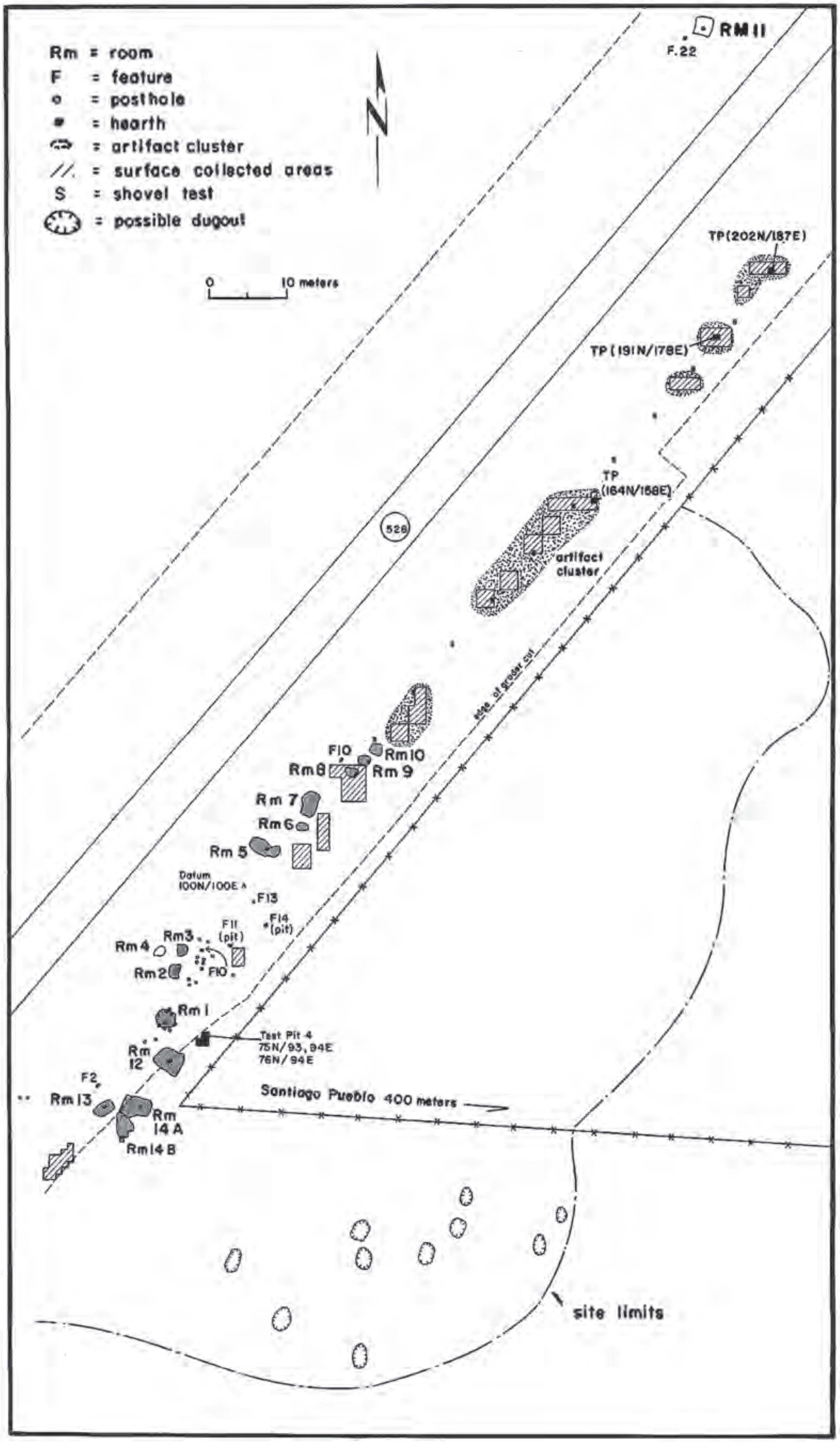

Figure 3. Plan map of LA 54147 showing excavated features within highway right-of-way, site boundary, and other possible features. (Courtesy the Office of Archaeological Studies, Museum of New Mexico).

Rooms 6, 8, 9 and 10 were the smallest, containing enough floor space for one individual. These rooms were about 2 m in length by 1.50 m in width and 10 cm in depth with a small hearth at one end of the floor. In contrast, Rooms 7, 11 and 12 were the largest, being square to rectangular in shape and about 4 m across. They contained central hearths, postholes, and some artifacts. Room 11 was quite distinctive in that the superstructure appears to have been burned and collapsed onto the floor (Figure 4). Here excavations uncovered ground stone fragments that were later identified as comal fragments, although they certainly did not resemble items commonly found in Pueblo contexts. Also present in Room 11 were a slab metate fragment, a two-handed mano fragment, and charred remains of beans, maize, and grass stems. The hearth in Room 12 had a small shelf constructed along the side of the feature, the function of which would become clear during the analysis of the features, artifacts and samples collected during the fieldwork: that is, this shelf would have held a comal.

Pottery, represented by approximately 6,500 sherds, was the dominant artifact type recovered from the site. Analyses revealed that most of these were Rio Grande glazewares consisting of Glaze E bowl and jar sherds that probably dated to the 1500s C.E. This was not surprising since that period corresponds with the occupation of nearby Santiago Pueblo; what was unusual was the extremely large number of vessels represented. Michael Marshall estimated that the collection was composed of about 3,000 vessels (Marshall 1989) Typically, this large number of vessels reflects long-term trash deposition. This interpretation did not, however, fully correlate with the amount and density of material found in the structures. That is, the small number of sherds would not typically account for so many different vessels. Another unusual characteristic of this assemblage was that there were roughly equal numbers of bowl and jar sherds. This was a marked contrast from nearby Santiago Pueblo where bowls outnumbered jars by about a 4:1 ratio. Whatever happened at the campsite involved the use of a lot of jars.

Only 305 lithic artifacts were collected from LA 54147. Those consisted of 148 pieces of flaked stone debitage, three cores, three tested cobbles, three cobble unifaces, four hammerstones, one projectile point, three bifaces, three beads, four axes, one one-hand mano, nine two-hand mano fragments, two undetermined mano fragments, 37 comal fragments, 16 undetermined pieces of ground stone, and 16 manuports. Most of the flaked stone was made of chalcedony and chert, with some obsidian and other materials while the ground stone was primarily sandstone. The most distinctive characteristic of the lithic assemblage was how small it was compared to the large number of sherds on the site. Indeed, there were 44 times more sherds than lithic artifacts at the campsite, compared to only four times as many at Santiago Pueblo.

In addition, a couple of other things seemed unusual. As mentioned before, the identities of the small ground stone artifacts that we eventually classified as comal fragments were unclear at first. They were tabular in shape, with rounded edges and finely ground surfaces that were highly burned. Initially the question was whether these were piki stones for making piki bread. The artifacts were shown to Marjorie (née Tichy) Lambert, who was Edgar Hewett's laboratory director during the excavations of both Santiago and Kuaua Pueblos. She said that these were not like the piki stones found at these two sites. This led to contacting Dave Snow, who identified them as comales and suggested looking at the collections from the nearby sixteenth century site of Casa Quemada located near Kuaua. Indeed, these ground stone artifacts from LA 54147 matched the comales from the Casa Quemada site.

That left one other unexplained artifact: the proximal end of a blade fragment that resembled green obsidian from Mexico. Robert Santley at the University of New Mexico identified it as matching obsidian blade technology with which he was

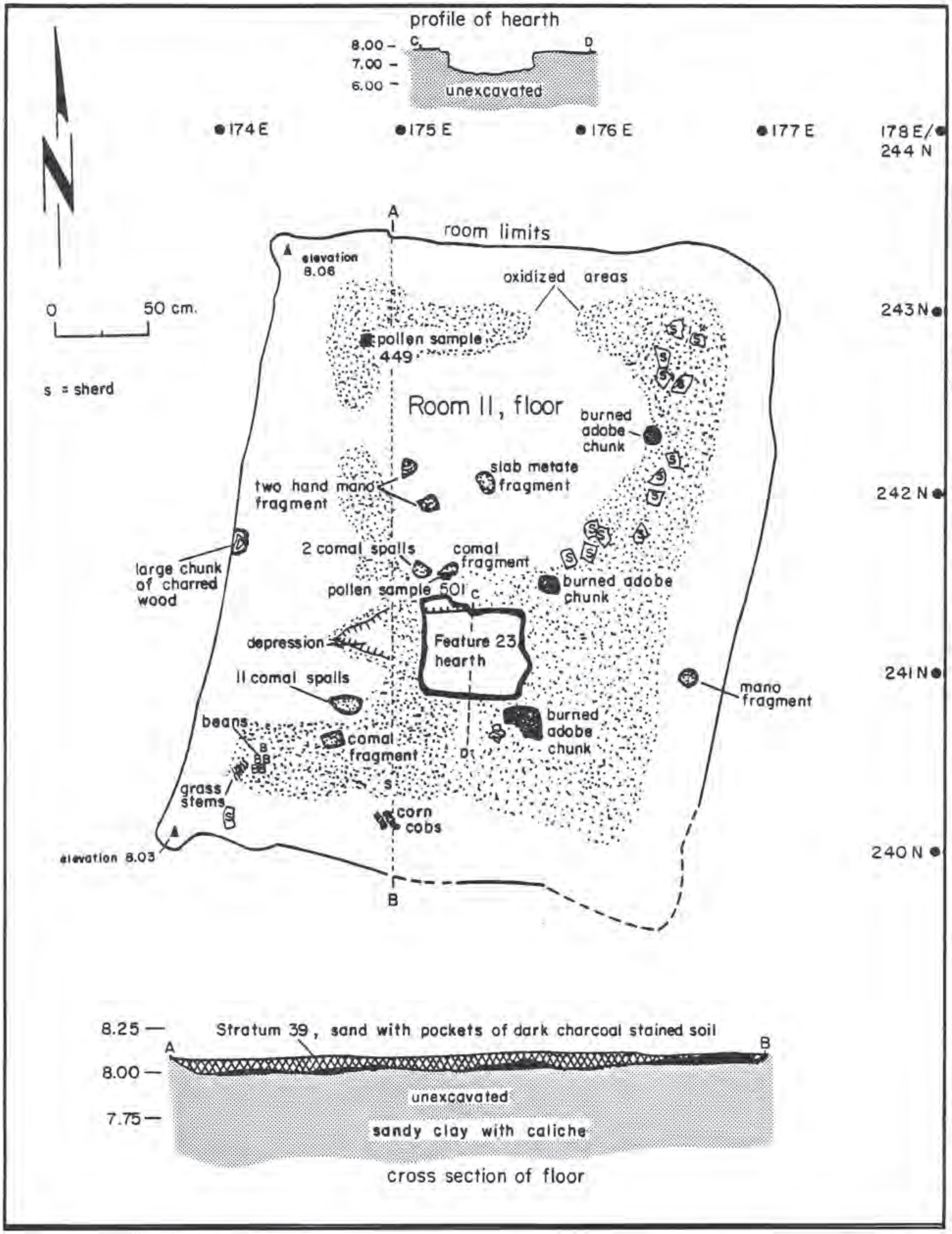

Figure 4. Plan view map of Room 11 at LA 54147, showing ground stone, comal fragments, and botanical remains. (Courtesy the Office of Archaeological Studies, Museum of New Mexico).

familiar from the Basin of Mexico. He provided a sample of Pachuca obsidian that visually matched the piece, and both were submitted to Bart Olinger at Los Alamos National Laboratory for X-ray fluorescence analysis. The two pieces exhibited the same elemental composition, affirming that the Coronado Campsite blade was made from Mexican obsidian.

At first glance, the LA 54147 botanical remains seemed like those identified at other pueblo sites, including maize, beans, and squash. In this case, however, very few wild plant remains were present though they are common in Pueblo plant assemblages. The large number of glazeware bowls and jars represented at the site probably reflects consumption of stored foods, after which the vessels were discarded. The contrasting scarcity of utility jars may reflect use of metal pots for cooking.

The faunal remains also initially resembled pueblo assemblages, with mule deer, pronghorn, and cottontail present. The surprise at LA 54147, however, was the identification of sheep bones. Of course, sheep were brought to New Mexico by Spanish explorers and colonists so their presence in an assemblage dating to the sixteenth century indicated that something quite different was going on at LA 54147.

Was this actually a Spanish campsite? This question seemed to be answered by the recovery of metal artifacts during the excavations. At first, it was suggested that the initial discovery of a nail or two was a by-product of the grading activities disturbing the surface deposits. But it soon became evident that metal artifacts were being found *in situ* within the fill of the structures. Overall, twelve nails, a jack plate, a clothes hook, a clothing straight pin, a metal plate, a metal strip, and several otherwise unidentified fragments were recovered. The heads of the nails generally have the same shape: two flat facets, a rectangular plan view with slightly rounded corners, and a top with a 140-degree cross-section. These nails resembled those found at the sixteenth century De Soto site in Florida (Ewen and Hann 1998:82). The jack plate consisted of an iron plate with broken rivets that had been part of a flexible armored vest of metal plates between layers of leather (closely matching one on exhibit at the Albuquerque Museum).

All this information seemed to be narrowing the identity of LA 54147 down to a Spanish site from one of two possible sixteenth century situations: the Coronado or the Oñate expeditions. Both were large expeditions with numerous personnel, equipment, and domesticated animals. In the case of Oñate, we know he camped in the vicinity of Puaray for a few days in June 1598. This would probably not account, we believe, for the large amount of trash at LA 54147, nor the presence of hearths within the structures reflecting a cool season of occupation. In addition, the pueblo of Puaray is now known to be located on the east side of the river (Snow 1975).

In contrast, the Coronado expedition stayed for the two winters of 1540-41 and 1541-42 at the pueblo they called Alcanfor and camped outside of the pueblo they called Moho for 50 to 80 days from February to March 1541. These represent longer occupations during cooler seasons that would, in turn, account for the large amount of trash and hearths being situated inside the structures. Alcanfor, probably the community now identified as Santiago Pueblo, was the first pueblo reached on the west side of the river (see further discussion below).

Crossbows are commonly listed in the inventory of the Coronado expedition, but not the Oñate expedition. Although none were recovered from LA 54147, copper crossbow boltheads (see Figure 2) were found at nearby Santiago Pueblo (Ellis 1957). The blade made of Pachuca obsidian may represent a broken piece of a *macana* or Mexican obsidian-edged sword. A side-notched arrow at the site also resembles a Texcoco point from the Valley of Mexico. The inventories note that members of the expedition brought with them arms of the land, which presumably reflects these traditional weapons. It seems likely, then, that the occupants of the structures at LA 54147 were the non-Spanish members of the expedition. Importantly, three corn samples were submitted for radiocarbon dating with a mean calibrated date of 1527 C.E. This date is clearly closer to that of the Coronado expedition than the Oñate expedition.

Of course, this conclusion, first presented by Vierra (1989), was not an easy one for some archaeologists to accept. The response by Vierra and Hordes (1997) addressed those concerns. Skepticism was certainly understandable given that historians had been arguing about the identification of the pueblos in the Tiguex Province for years. For example, Schroeder (1992) considered the LA 54147 campsite to be associated with the siege of Moho and not the winter encampment at Alcanfor. In retrospect, it was good enough that he accepted the argument that the site was associated with the Coronado expedition. There were quite a few archaeologists who didn't agree with that basic interpretation, although they were often convinced after attending public lectures about the site. In addition, Flint (1992) and Rhodes (1997) continued research on the material culture associated with the expedition. Ewen and Hann's (1998) study at the De Soto site also provided links between the two competing sixteenth century explorers.

Piedras Marcadas Pueblo

Piedras Marcadas Pueblo (LA 290) is the largest and most intact of the remaining Contact-period villages in the Tiguex province (Marshall and Walt 1985). Marshall reports that when he visited it in the 1980s, the site covered about 9 ac with an estimated 1000 or more ground floor rooms arranged into three roomblocks and was at least 80 percent intact. LA 290 was first described by Reginald Fisher (1931) in his survey of the Santa Fe Plateau as Fisher Site #7 and was later called the Zuris-Mann site after the names of its landowners for 30 years starting in the 1950s. In the mid- to late-1980s, at the same time that Vierra was working at Kuaua and the Coronado campsite, Piedras Marcadas was exposed to a series of threats. The site owners had allowed a neighbor to dig potholes in some parts of the site while making plans to develop the property. In 1985, the landowners submitted plans for an apartment complex that would completely obliterate the pueblo.

Schmader recalls being one of several archaeologists (along with Kit Sargeant, Carol Condie, and Jim Walker) who raised the alarm at Albuquerque planning commission meetings and succeeded in having the development plans denied. The frustrated landowners, claiming they could never get full economic value from the property, challenged the preservation community to buy out their interests. Michael Marshall (1987, 1988) was contracted to determine the site limits and a write a National Register of Historic Places nomination (1986). After several years of negotiation and assembling funds, the City of Albuquerque succeeded in buying the property for inclusion in its open space system. When Petroglyph National Monument was established in 1990, the site was added as an outlying unit to recognize the role its residents played in creating many of the sacred rock images found in nearby canyons.

National Park Service and City of Albuquerque staff conducted a series of field meetings and tribal consultations soon after the national monument was established. One of these field visits occurred at Piedras Marcadas Pueblo (Figure 5), where representatives from several tribes delivered a clear message. The site, they related, was an ancestral village and directly tied to the continued lifeways of the Southern Tiwa peoples. Although today's living descendants are principally from Sandia and Isleta pueblos, nearby Rio Grande pueblos and others from across the state expressed interest in the site and its management. One of the strongest messages was delivered to archaeologists themselves: the profession was so efficient at completely excavating (thereby destroying) ancestral sites that virtually

Figure 5. Tribal elders examine a slingstone on a site visit to Piedras Marcadas Pueblo (LA 290). Photo by M. Schmader.

nothing was left after just several field seasons. In this regard, tribal officials were specifically referring to UNM's activities at Kuaua and Santiago pueblos starting in the 1930s. Other ancestral Tiwa sites in the Albuquerque area had long since been overwhelmed by urbanization and most have now been built over.

The last remaining site in the best condition was Piedras Marcadas Pueblo. The emergent feeling was that, out of respect for tribal concerns, broad-scale excavations should not be conducted at the site, that ancestors likely buried there should be left alone, and that any research conducted should be as non-invasively as possible. The use of remote sensing instruments was encouraged, but actively open public access to the site should be discouraged. These thoughts laid the groundwork for the ensuing three decades of investigation at the site (Schmader 2011, 2016a).

In 2005, the first in a series of geophysics surveys was conducted at Piedras Marcadas Pueblo. Various techniques were evaluated, and electrical resistivity (ER) produced the best results (Figure 6). ER obtains signals from electricity sent through the ground and compares areas of higher and lower electrical resistance to predict where architecture (i.e., adobe walls) and natural soil are located. As a result, imagery similar to an X-ray outline of adobe-walled rooms can be obtained under the right conditions (Markussen et al. 2007). ER survey was

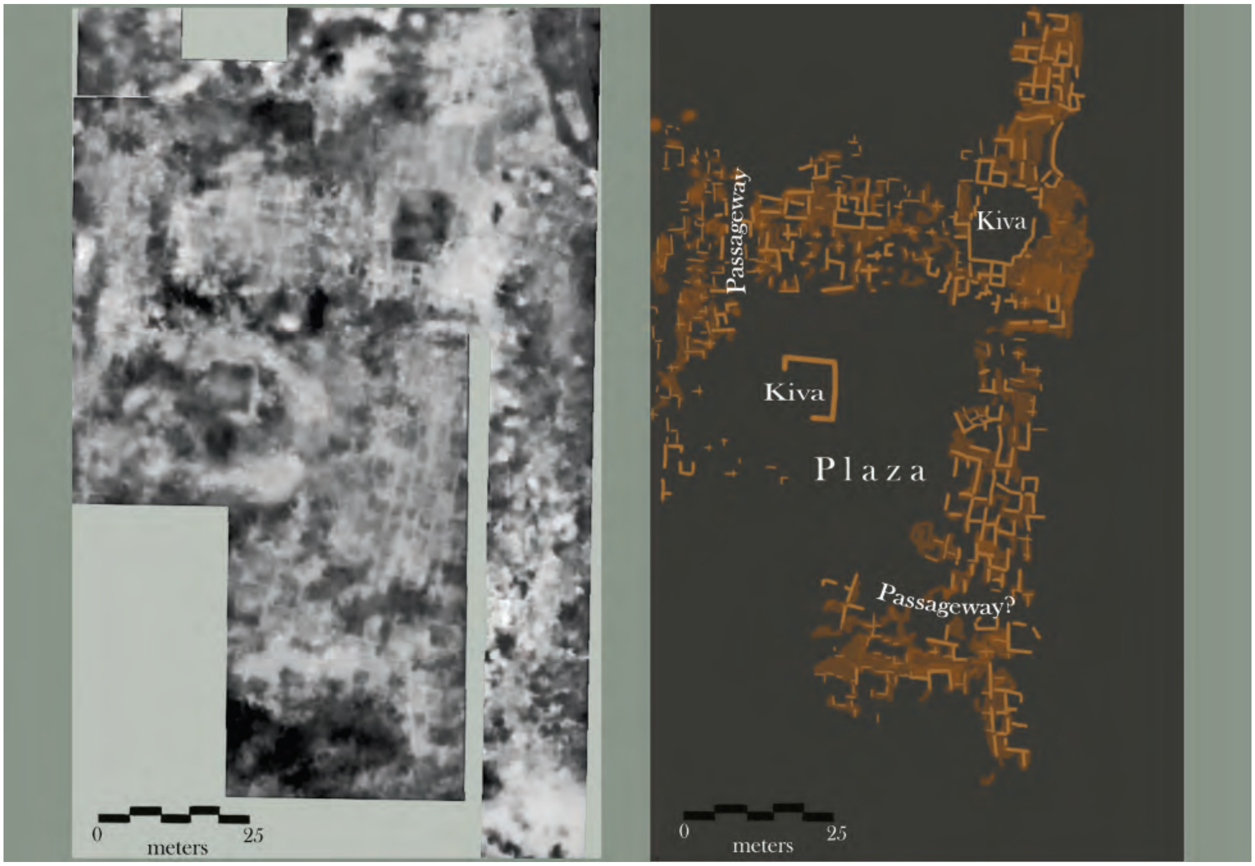

Figure 6. Electrical resistivity survey results (left, original map by C. Markussen) and generalized adobe wall architecture (right) at the central roomblock of Piedras Marcadas Pueblo.

focused on the central roomblock of the site, which was the most intact of the pueblo's three major roomblocks. About 450 ground floor adobe rooms were found in a large quadrangle covering some 2.5 ac (80 m east-west by 120 m north-south). A large, open interior plaza, several passageways, and at least two square kivas were also detected (Figure 6).

Shrub removal operations to clear the ground for ER instruments exposed a broad surface area of the site. The clearing also exposed more artifacts, which included some telltale pieces of metal. When a wrought iron nail was found, it was taken to Richard and Shirley Flint for identification. They confirmed it was very consistent with nail types known from the Coronado expedition (or at the least, quite likely dated to the sixteenth century). Charlie Haecker, then of the National Park Service, suggested systematic metal detection surveys at the site. In April 2007, the first of those surveys yielded immediate results of sixteenth century artifacts including chain mail, lead musket balls, copper crossbow boltheads (arrow tips), more nails, and assorted personal items. The physical evidence was convincing: the largest remaining Contact-period Tiguex village had also been the scene of a major encounter with the Coronado expedition (Schmader 2011). At least one or more battles had occurred at Piedras Marcadas Pueblo. The most convincing evidence was the crossbow boltheads, since Coronado's was the only expedition that had ones made of copper (Rhodes 1997).

Subsequent work at Piedras Marcadas has been steady and methodical over the past dozen years. A 2018 grant from the American Battlefield

Protection Program helped fund the most recent phase of field work. Intensive metal detection surveys have now covered an area of 9,200 square meters (2.3 ac) with the recovery of over 1,600 metal artifacts dating to the sixteenth century. Most of the metal artifacts are quite shallow, just 5 to 10 cm below the modern ground surface, and there are no known items from the site dating to the 1600s through the 1800s. That is, the site has very good integrity and no intrusion of datable material between the sixteenth and twentieth centuries. Many artifacts are pieces of iron and fragments of nails, but the assemblage includes a wide variety of personal items and ammunition. The current inventory of artifacts from Piedras Marcadas includes (see Figure 7):

- 33 copper crossbow boltheads and 13 bolthead fragments
- 165 personal items (possessions, clothing adornments, buckles etc., including 28 aglets)
- 60 lead balls and 102 other lead pieces (molded, blobs, off-casts, castings)
- 69 pieces of thicker copper alloy sheet
- 76 pieces of thin copper alloy sheet (including 24 bell fragments)
- 105 facet-headed nails and 85 faceted nail heads
- 99 other nail types and 53 other nail heads
- 256 nail shaft pieces
- 60 links of chain or chainmail and 133 other wire fragments
- 44 pieces of heavier iron
- 239 pieces of fragmentary iron

In addition to the listed sixteenth century metal artifacts, 66 slingstones and six chipped stone projectiles (all attributed to the *indios amigos*), along with five stone projectiles and two axe heads (presumably Puebloan), have been found. This inventory probably represents the largest quantity and diversity from any currently documented Coronado site. The large overall number of items may be attributed to saturation of metal detection surveys but the high numbers of certain artifact types (crossbow boltheads, lead balls, personal items, chain links, slingstones) can only be attributed to the intensity of fighting that occurred at the site. Large numbers of copper sheet fragments, many broken nails and nail pieces, wire fragments, and iron pieces all relate to the great intensity of energy expended at the site during the fighting.

Given the breakage of artifacts, the loss of personal items, and the quantity of ammunition the inescapable conclusion is that Piedras Marcadas Pueblo was the scene of hard-fought conflict. The distribution of sixteenth century metal in relation to the pueblo's adobe architecture indicates that there were areas of attack, skirmish, and defense within several parts of the village. In addition, stone fighting implements (slingstones and projectile points) are unique and compelling of Coronado's armed Mexican *indios amigos* contingent. Piedras Marcadas was clearly a place where interindigenous conflict occurred between Pueblo peoples defending their village against European and Mexican attackers (Schmader 2019). These results have been presented in a series of articles and publications (Schmader 2011, 2014, 2016b, 2017). Due to the specialized nature of battlefield research and analysis of metal detection and artifact patterning, other reports have been made at biannual conferences on conflict archaeology (Schmader 2016c, 2019).

The Search for Coronado Sites

Historians, archaeologists, and geographers have spent decades trying to match expeditionary chronicles' descriptions of major sites with on-the-ground physical evidence. It is, after all, a compelling pursuit but one that is fraught with pitfalls. The

Figure 7. Examples of sixteenth century metal artifacts recovered from Piedras Marcadas Pueblo. A) chainmail links. B) aglets (clothing lace tags). C) clothing fasteners. D) needles. E) facet-headed nail. F) buckle. G) horse bridle cinch. H) belt loop. I) broken dagger tip. J) strap end. K) musket (arquebus) lead balls. L) copper crossbow boltheads. M) Mexican-style stone projectiles. (Photo by M. Schmader).

Coronado exploration is not the only Contact-period venture to have left behind documents, of course. Subsequent entradas from Nueva España into Nuevo México, as the region came to be known, included Chamuscado-Rodríguez (1581-1582), Espejo (1583), Castaño de Sosa (1590-1591), and Morlete (1590-1591; Hammond and Rey 1966). Each successive exploration described varying numbers of major villages found along their routes, and each used different schemes to name them. Later expeditions seem to have been more thorough in naming most of the villages they encountered, and some even included estimated sizes or room counts (see Barrett 2002).

As for Coronado and the various documentary mentions of specific places, only four in the Tiguex province might offer any clues, leaving two-thirds of the pueblos with no name or documentary description. Of those four places, three have lengthy mentions in the documents: Alcanfor or Coofor was the expedition's main base camp when it arrived in the fall of 1540. Moho or Mohi was the site of a prolonged siege that took place in the early months of 1541. The village called Arenál was attacked and Pueblo prisoners were rounded up to be burned at the stake after the battle—one of the most egregious acts that took place during the expedition. Another site called Pueblo de la Cruz was the scene of a short battle as well, barely described in the chronicles. The rest of the towns in the Tiguex province are only mentioned in passing, such as statements about crossing the river to look for supplies, or that most of the pueblos had been robbed of timbers for fuelwood and then burned.

Documentary clues about actual site locations are scanty. Alcanfor was a major town described as likely situated at the north end of the province. Moho is said to have been the "strongest" of the pueblos and to "have been on a height"; there are also descriptions of an "exceedingly deep well" having been dug there and fighting that occurred on the rooftops, implying buildings of more than one story in height. Former passageways in the village were noted as having been "palisaded" or blocked off. Arenál had *estufas* (kivas) which were burned.

A few mentions of distances between towns provide some of the only other clues. Arenál is said to have been a half-league away from Alcanfor, Moho was "three to four leagues away" from Alcanfor, and Pueblo de la Cruz was a league distant from Moho (see Schmader 2011). Here the problem of the length of a league enters into the picture, since these distance measures were by no means standardized and could vary significantly depending on who was describing the distance and how it was covered. That is, if places were described in general terms as somewhat distant, the measure might be different than if it was possibly counted off in paces; some distances are viewed as straight lines while others take into account terrain and winding routes. The Coronado expedition very likely had personnel to track some of the distances covered, but how consistently this was done is not clear either. At best, the length of a "standard league" as set out in sixteenth century Spain was 2.63 mi but the amount of variance could be within the range of 2.1 to 3.5 mi (Chardon 1980; Flint and Flint 2005:11).

These are the best tools there are to work with. But even given the limitations built into the mix, it is still not a hopeless exercise to evaluate present-day advances in knowledge about the Tiguex province's sites and the most logical matches between descriptions in the chronicles and physical evidence on the ground. It has become increasingly clear that there is potential for Coronado materials to have been left in places that were not mentioned in the documents. It is also clear that in the case of the Tiguex province, there are relatively few of the putative "twelve towns" that are intact enough to explore in any meaningful way. This limits the window of opportunity but provides appropriate caution in trying to make identifications. New physical evidence needs to be assessed in a sober way that makes the best sense of our current state of knowledge.

There are only a few competing logical alternatives for matching Coronado's named sites with known archaeological locations. Again, the sites most prominently discussed in the documents are Alcanfor (the expedition's basecamp) and Moho (the besieged pueblo). The two sites with the largest archaeological assemblages of Coronado materials are Santiago pueblo/Coronado campsite (LA 326/LA 54147) and Piedras Marcadas pueblo (LA 290). This really only leaves two main possibilities, logically: that Santiago is Alcanfor and Piedras Marcadas is Moho, or vice versa. The only other possibilities are that one or both of these sites are valid Coronado localities but are not mentioned in any documents, or that Moho is further to the north on the Santa Ana mesa above San Felipe. Both of these latter possibilities have been put forward over the years, but we believe the evidence points elsewhere. Most researchers conclude that Santiago/LA 326 is Alcanfor, a conclusion with which we also agree. If so, then the Coronado campsite/LA 54147 was indeed part of the winter encampment of late 1540-early 1541. This would leave Kuaua/LA 187 as the documentary site of Arenál, an assessment with which Flint (2011) has also agreed. By extension, that also leaves Piedras Marcadas/LA 290 as the siege site of Moho, and the nearby Calabacillas pueblo/LA 289 as the documentary site of Pueblo de la Cruz, where a brief battle also occurred.

These are the basics of the archaeological evidence and the documentary descriptions. The only real alternative is that the base camp of Alcanfor was at Piedras Marcadas. Calabacillas pueblo/LA 289 would then be the site of Arenál, Santiago/LA 326 would be the site of Moho, the campsite/LA 54147 would be the siege encampment, and Kuaua/LA 187 would be Pueblo de la Cruz. Schroeder (1992) first suggested this possibility and more recently Mathers (Mathers 2020, Mathers and Marshall 2014) has argued for it. Considerations such as what constitutes a “height” or what an “exceedingly deep well” might look like, have not improved the ability to offer one alternative over another.

These choices should have sorted themselves out as the artifact assemblages from both Piedras Marcadas and Santiago have grown over the recent years. One site should have looked more like an encampment and the other more purely like a battle site. In fact, the two assemblages have gotten more similar as they have grown in size and content during recent work (compare Mathers [2020] and Schmader [2019]). Both assemblages seem to be battle-oriented and more fieldwork has only produced more ambiguity. At this point, though, the battle-related assemblage at Piedras Marcadas is most consistent with the expedition’s longest and most intensive fighting. With greater quantities of ammunition, lost or broken items, clear tactical relationship between artifacts and architecture, indigenous weapons, and a real candidate for a well, we continue to assert that LA 290, Piedras Marcadas Pueblo, is the site of Moho. In retrospect, LA 54147, the Coronado campsite makes more sense as the expedition’s overwintering place with its evidence for a prolonged cold-season occupation and likely reoccupation the following winter, due to the fill within the dugouts/structures. Nearby Santiago Pueblo does seem to best fit the description of Alcanfor, as several researchers agree, but must it have been the scene of more fighting than the chronicles describe. The bottom line is that no updated interpretations can be done without seriously considering the assemblages at *all four* investigated sites of Kuaua, LA 54147, Santiago Pueblo, and Piedras Marcadas Pueblo.

Retrospective

The lives of many Pueblo and other Native communities—from northern Mexico to Zuni, Hopi and Acoma; from Piro country to the upper Rio Grande as far north as Picuris; from Zia and Jemez and many groups further east including the Galisteo Basin, Pecos River pueblos, and onto the great plains—were permanently impacted by this first significant contact with outsiders. But no area was more deeply shattered than that of the Southern Tiwa. The reported 12 towns occupied along the Rio Grande at the time of contact are estimated to have had a total population of some 10,000 to 20,000 people (Barrett 2002). During the short duration from fall of 1540 until spring 1541 of the “Tiguex War”—the first named conflict in United States history—every Pueblo village was raided or burned, great stores of food and clothing were taken, hundreds of lives were lost, and thousands of people were displaced. By the 1620s, in the early Colonial period, the Tiguex province consisted of just three remaining pueblos at Sandia, Puaray, and Alameda. The estimated population was just 800, a population loss of about 95 percent in no more than 80 years (Barrett 2002).

There were many factors that Coronado could not control about the expedition. He could never have delivered on the high hopes and expectations of finding an overland route to Asia's doorstep, nor overcome the profound disappointment. He could not have established diplomatic or economic relations on behalf of Spain with any foreign land that would have reaped sufficient wealth or prosperity for the king, the viceroy, himself, or the many investors in the project. The timing of the entrada could not have been worse because leaving Compostela in late February of 1540 meant crossing the scorching Sonoran Desert in June; his worn out and hungry people had little choice but to fight for food once they reached Zuni. By advising that the expedition move to the Rio Grande valley in the fall, Alvarado unwittingly led them all into a bitterly cold mile-high winter and the many depredations that followed.

Similarly, Coronado had little control over a variety of cultural factors. Spanish reconquest of the Iberian Peninsula, which ended in 1492, directly contributed to prevailing attitudes surrounding the exploration and appropriation of new lands. All of Europe engaged in a competitive sixteenth century age-of-discovery mentality that justified finding and taking new-found territories around the world. Spain happened to be at the forefront of that activity though, and in particular carried forth a view of opponents and native people as mostly lesser beings. It would take decades of work by clerics such as Bartolomé de las Casas to convince royalty, administrators, and their agents to regard native persons as actual people with redeemable souls.

There was, in any case, little tolerance for resistance on the part of indigenous populations at the time. With the ends thus justifying the means, European responses were harsh and retributions swift. The epitome of these attitudes was expressed in the *requiermiento*, an almost theatrical display that involved reading a long text in archaic Spanish to Natives who could not possibly understand the content. The speech would relate the creation of the world, the power of God, the role that the sovereigns had in executing the will of the pope and the Catholic church, and a call for Native people to submit to the king. By so doing, they would be subjects of the crown and treated well but if they resisted, but those acting on behalf of the king reserved the right to use any force or means necessary as punishment or to induce submission (Flint and Flint 2005:2). These prevailing attitudes spilled over from generalities to specific outcomes in the case of Coronado and Native people, especially the Southern Tiwa. Acts of resistance were countered quickly and forcefully, and organized resistance could not be tolerated.

Vázquez de Coronado still had the ability to have affected a different outcome for his undertaking. He might have sought to achieve better initial relations with Pueblo and other Native peoples. This was not his choice, however, all the way from the route in northern Mexico until reaching Zuni. There, as mentioned, the summertime crossing of the desert meant his people were exhausted and starved so that their expectations of reaching a prosperous place were all the more greatly disappointed. There was little room for diplomacy in that context; for Coronado's part he tried to show strength by personally leading the initial assault on the Zuni village of Hawikku. He was nearly killed by a hail of stones as a result and had his life saved by several captains (Flint and Flint 2005).

Coronado's arrival at Tiguex, with his eventual basecamp established at the village he called Alcanfor (or Coofor/Ghufor), was plagued by further bad timing with the winter coming on and continued food shortages. Ensuing requisitions for food, shelter, and clothing caused great strain on the Southern Tiwa, who refused to comply willingly or to submit to such demands. The expedition resorted to taking what it wanted and feeding its horses on valued corn stubble, which caused great resentment. A Pueblo man brought charges of rape or attempted rape on his wife, but no justice was delivered.

Any opportunities to establish trust closed in on Coronado, all the more so when the Pueblos responded by stealing horses and killing some *indios amigos*. From that point on, one retaliation followed another, and Coronado never actively gained control, nor apparently sought to do so. The village of Arenál, not far from Alcanfor, was then assaulted and set afire. Pueblo men who surrendered with the understanding of being peaceably taken as prisoners were instead rounded up to be burned at the stake by Captain García López de Cárdenas. When the Pueblo men fought back for their lives, another brutal melee ensued (Flint and Flint 2005).

Finally, the last of the Tiwas who stayed in their homeland organized and fortified themselves in the "strongest" of their villages at the place called Moho, three or four leagues distant from Alcanfor. At Moho, there was little room left to negotiate either. The reading of the *requiermiento* there was met with hissing and a hail of arrows. The first assault on the pueblo did not go well, as many expeditionaries were felled by a barrage of stones. The ensuing siege, which was under the direction of López de Cárdenas, lasted anywhere from 50 to 80 days and resulted in several smaller attacks with a final desperate run for freedom by the last Puebloan resisters one cold night. Those who were not killed during the attempted escape were rounded up the next morning, freezing on the banks of the river. Coronado had broken the back of the resistance, but at a terrible price as several hundred more Tiwas lost their lives (Flint and Flint 2005).

It was not uncommon for large undertakings to be subjected to review or charges once they were finished. The Coronado enterprise was no exception, and anonymous letters were sent to Spain complaining of many actions that took place. These charges were actively reviewed because, at the time, transgressions against native peoples came under New Laws of the Indies instituted in 1542, just as the expedition ended. Typically, charges were brought forward to the Council of the Indies since that was one of the oversight functions of that body. The entire book *Great Cruelties have been Reported* (Flint 2002) is a record of the resulting trial and proceedings.

Vázquez de Coronado was formally charged with executing Indians at the village of Chiametla in Mexico; of failing to administer the outpost of San Geronimo; of provoking war without good cause against the natives of Cíbola (Zuni); of causing a revolt in Tiguex by setting dogs on his prisoners; of needlessly and secretly executing another of his prisoners; and of failing to settle lands in Terra Nueva (Flint 2008:239-240). The trial took place in Nueva España from 1544-1545 with witnesses providing testimony on both sides. Quite swiftly, in early 1546, Viceroy Mendoza and several others on the Council ruled that the prosecution had not proved its case and that Coronado had shown he was not responsible for any charges brought against him. It was proven that Native peoples of La Tierra Nueva had been abused and subjected to violence, but it could not be proved that Coronado was either present nor fully culpable for the actions of his men. Because Mendoza had personally chosen Vázquez de Coronado to lead the expedition, he had good motivation as well as an obvious conflict of interest in obtaining an acquittal (Flint 2008:240).

The outcome was different, however, for Coronado's chief captain, the *maestre de campo* García López de Cárdenas. Cárdenas was the captain responsible for rounding up Pueblo warriors who surrendered in good faith after the battle at Arenál. Rather than receive them as prisoners of war as promised, Cárdenas elected to burn them at the stake and much brutality ensued—in fact, the rest of the Tiguex War and its subsequent events arguably turned on that one fateful decision. Cárdenas returned to Spain after the expedition to administer his family's estate, and so was subject to trial by the Council of the Indies there. At the end of 1549, Cárdenas was convicted but through a series of appeals his fine and length of sentence were reduced. In the end, Cárdenas was fined 200 ducats and ordered to serve 12 months of what amounted to house arrest at his own property in Málaga, Spain. That was the sum total of any punishments handed out for the entire Coronado expedition, during which hundreds of Pueblo people died and dozens of villages were raided or burned (Flint 2008:240-241).

Epilogue

As we write this in the fateful summer of 2020, tumultuous changes are coursing through society and its various views of history. The ways our past has been and is portrayed, glorified, or cast into various forms of dominant cultural expression can no longer all be assumed as appropriate nor permanent. Statues, flags, the names of places, and the way histories are told all seem susceptible to renewed scrutiny, and rightly so. Certainly, the events and outcomes surrounding Coronado's epic entrance into the North American Southwest will not be immune from continued examination in the near future.

There are few (if any?) sculptures honoring Francisco Vázquez de Coronado. But his name is prevalent, from the Coronado Monument on the Mexico-Arizona border to the designation of parts of Interstate 40 as the Coronado Freeway; in Albuquerque the city's largest mall, a park, an elementary school, several businesses, and a mobile home park all bear his name. And of course, the state's monument, long ago promoted by Edgar Hewett at Kuaua, is now called Coronado Historic Site. A few places also bear Hernando de Alvarado's name including Albuquerque's transportation center (and site of the former Alvarado Hotel), along with a city park, an elementary school and a street. Proposals to rename Albuquerque's Coronado and Alvarado city parks are already under consideration. How long these names will last, and how or if the names are changed at all, depends on the awareness and intentions of dialogues with Native communities and the public at large. Our ability as archaeologists and historians to fairly, accurately, and unemotionally relate the events of an often-turbulent past should play a key role in informing that dialogue.

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Pottery Designs of the Middle Rio Grande Valley During the Spanish Contact Period

HEATHER L. SELTZER

Large-scale archaeological investigations in the Middle Rio Grande valley first commenced with excavations by Nels Nelson in 1914 and later sizable excavations by Edgar Lee Hewett and Marjorie F. Tichy (later Lambert) at Kuaua, Santiago, and Puaray in the 1930s and 1940s. Unfortunately, documentation from excavations at these Middle Rio Grande Classic period villages is poor to nonexistent. Since then, few archaeologists have revisited these collections and the Middle Rio Grande valley has been overshadowed by academic investigations to the north in the Tewa Basin and on the Pajarito Plateau. Recent compliance projects have, however, provided important insights into other communities in the Middle Rio Grande valley such as those of Alameda Pueblo (Cordero 2013), Pottery Mound (Franklin 2014; Schaafsma 2007), Piedras Marcadas (Franklin 2017; Schmader 2011), and Tijeras Pueblo (Cordell 1980). With the improved understanding of the A.D. 1450 to 1700 time period in the Middle Rio Grande, a reexamination of existing collections to investigate direct impacts of Spanish colonization and the Pueblo Revolt in the region would be fruitful.

This paper reports the results of research on Puebloan iconography on pottery from the Middle Rio Grande valley, starting with the production of glaze painted pottery through the Post-Pueblo Revolt period, to assess the impact of the Spanish on the Pueblo people with a focus on pottery from sites dating to between A.D. 1300-1700. Previous studies have examined the impact of the Spanish on the Pueblo people by focusing on change at the macro-level to understand resistance, but this study examines change on the micro-level by relying on the changes of designs to illustrate the Middle Rio Grande Pueblos response to the outside force. Results of this study indicate that Spanish colonization mainly impacted vessel form and caused a decrease in the use of overtly religious motifs on pottery, such as anthropomorphic religious figures. These differences were particularly pronounced during the Contact and Revolt periods in the Middle Rio Grande, especially when contrasted with the Northern Rio Grande.

The Late Prehispanic Middle Rio Grande Valley and Three Centuries of Spanish Contact

Geographically speaking the Middle Rio Grande valley is situated south of the Northern Rio Grande valley. It starts in the Galisteo Basin and extends to the area just south of present-day Albuquerque, near Isleta Pueblo. Environmentally speaking, the Middle and Northern Rio Grande valley regions share a similar environmental zone with the Middle Rio Grande being at lower elevation and more arid. The Middle Rio Grande valley is characterized by bisecting mountain ranges, meandering rivers, and a sizeable floodplain (Figure 1). Both regions had a diverse prehispanic culture and were impacted by the arrival of the Spanish in 1540.

I first provide a brief overview of Pueblo history and Spanish contact in New Mexico to provide context for the research presented here. For the purposes of this paper, I begin Pueblo history with the construction of permanent, sedentary

Figure 1. View of the Middle Rio Grande valley from Kuaua Pueblo, Coronado Historic Site, Bernalillo. Photo by author.

villages but acknowledge that the Pueblo people and their ancestors lived in the Rio Grande Valley thousands of years before that. Significant changes in settlement size and material culture, alongside the development of archaeologically definable communities occurred by A.D. 900. This time period is known as the Developmental period (A.D. 900-1200) and was categorized by dispersed populations living throughout the Rio Grande valley in small sedentary hamlets and villages composed of semi-subterranean pithouses early in the sequence and above-ground pueblo roomblocks later.

The Coalition period (A.D. 1200-1325) saw a drastic increase in the number of sites in the Rio Grande valley suggesting an increase in population. This period is marked by a transformation of Rio Grande society from small, scattered hamlets and villages to the creation of larger villages with communal and ceremonial facilities (Cordell 1979; Franklin 2020; Larson 2013). It is also during the end of the Coalition period and the transition to the Classic period that Glaze Ware technology reached the Middle Rio Grande valley. During the Classic period (A.D. 1325-1600) very large pueblos were built in the Chama, Pajarito Plateau, Taos, Santa Fe, Galisteo, Pecos, and Albuquerque areas in response to increasing populations and conflict (Figure 2). Whereas Coalition period populations lived in dispersed sites over a large area, Classic period populations coalesced into large, multi-ethnic villages in specific regions.

Figure 2. Map of the Middle Rio Grande valley and vicinity.

This shift has been attributed to degrading environmental conditions, an influx of people from the Mesa Verde area, and increased competition and conflict within the region (Eckert and Cordell 2004; Ortman 2012). Many of these large sites experienced extensive remodeling and construction which resulted in multistoried roomblocks of thousands of rooms arranged around multiple plazas (Graves and Eckert 1998). During this period, the Kachina religion developed and played a significant role in the social and ceremonial cohesion of Pueblo peoples. Kachinas are ancestral gods who bring rain, harmony, and well-being to Puebloans (Schaafsma 2000). Kachinas are depicted by masked human dancers and other images (e.g., feathers on poles) that represent the manifestation of the gods. The Kachina religion is still found in all modern Rio Grande Pueblos, although only traces remain in the southern part of the Middle Rio Grande valley.

The diagnostic technological development of the Classic period is the incorporation of a lead-based glaze to painted designs on pottery (Figures 3a-c). The earliest common incorporation of lead or copper glaze technology into ceramic decoration occurred in east-central Arizona and in the area around contemporary Zuni and Acoma in west-central New Mexico. The incorporation of sub-glaze and glaze paints into White Mountain Redware and early Zuni and Acoma Glaze Ware has been well studied and discussed by archaeologists (Eckert 2008; Habicht-Mauche 2006). Lesser known, however, is the direct relationship between these mid- to late thirteenth century Glaze Ware types and the advent of glaze painted pottery in the Middle Rio Grande valley. While most researchers infer the origins of Glaze A to have been through direct exchange or, more recently, advocate for a migration of groups including potters from these areas into the Middle Rio Grande valley during the onset of the fourteenth century, these remain untested hypotheses (see Eckert 2008). Nevertheless, by A.D. 1330, several large villages in the Middle Rio Grande valley produced Agua Fria Glaze-on-red (Glaze A; Figure 3a). Glaze A differs from later Glaze Ware types as it was more widely produced, unlike the specialized production of later types at Tonque Pueblo and San Marcos Pueblo for example (Eckert 2006; Morales 1997; Schleher et al. 2012).

The production of Glaze A vessels extended to approximately A.D. 1400 and possibly later (Franklin 2018). Glaze B pottery was produced between A.D. 1350-1400, with Glaze C pottery produced between A.D. 1425-1500 (Figure 3b). Glaze D types were produced A.D. 1470-1515, although Snow (1997) argues Glaze D may have been produced up until the early 1600s. The evidence for that length of production is tenuous, but possible. Glaze E represents the earliest definitive Glaze Ware type produced during early Spanish contact of the era between A.D. 1500 and the early 1600s. The final Glaze Ware type, Glaze F, was produced between approximately A.D. 1520 until 1700 and is most encountered on sites after the Spanish colonization of New Mexico in 1598 (Figure 3c). Glaze F vessel forms also occasionally included European-inspired or copied forms such as soup plates. Glazes D-F are known for the presence of runny glaze and were most produced in the Galisteo Basin, although several production locations are known in the Middle Rio Grande and Socorro areas.

The Historic period in the Middle Rio Grande region begins with the Spanish entrada in 1540 and encompasses 400 years of a shared history among Indigenous, Spanish, and Anglo-American people. The history of the Middle Rio Grande is too vast to discuss in detail, but see Cordell (1979), Kessell (1979), and Barrett (2002) for more expansive discussions. I provide here a synthesis focusing on the time period relevant to this paper (A.D. 1540-1700). In 1540, the Spanish conquistadors and subsequently the Franciscan missionaries arrived in New Mexico during Francisco Vásquez de Coronado's expedition into the American Southwest. A significant outcome of Coronado's

a

b

c

Figure 3. Examples of Glaze Ware pottery: (a) Glaze A bowl, Sanchez Glaze-on-red (Catalog No. 21412); (b) Glaze D jar, San Lazaro Glaze polychrome (Catalog No. 11271); (c) Glaze F jar, Kotyiti Glaze-on-red (Catalog No. 16244). Images not to scale. Courtesy of the Museum of Indian Arts and Culture, Museum of New Mexico, Santa Fe, New Mexico.

arrival was the Tiguex war that lasted four months between A.D. 1540-1541 (Kessell 1979). During this conflict, Coronado's forces and Mesoamerican allies attacked and significantly damaged major Middle Rio Grande villages, such as Kuaua, Santiago, Piedras Marcadas, and Arenal (Barrett 2002:26-27). As a result, many major villages were depopulated, and people fled to adjacent areas in the Northern Rio Grande.

In addition to Coronado, other Spanish expeditions traveled through the Rio Grande region throughout the sixteenth century, including the Rodriguez-Chamuscado expedition in 1581, the Antonio de Espejo expedition in 1582, and the Gaspar Castaño de Sosa expedition in 1590 (Espinosa 1988). In August 1598, Don Juan de Oñate arrived at the Tewa pueblo of Ohkay Owingeh and in the same year established the first Spanish capital of what would become New Mexico—the Spanish-named San Gabriel—immediately adjacent to the pueblo, known then as Yunque'owingeh. At this time, Pueblo people were subject to Spanish programs of forced conversion, taxation, labor, and tribute in the form of goods or time, under the *repartimiento* system. New Spanish foods, such as European fruits, vegetables, and new livestock including sheep, cattle, and goats also were introduced to the Pueblo people living along the Rio Grande.

In the early 1600s, the Spanish forced Natives to build missions throughout the new Spanish territory. Each mission had an established church and convent with living quarters for the religious clergymen. By 1630, a significant decrease in the size and frequency of Pueblo sites in the Middle Rio Grande is identifiable in Spanish historic accounts. Tensions grew between the Franciscan friars, colonial governors, and the Pueblos. The unstable situation resulted in small rebellious acts by the Pueblos, such when the Taos people killed their friar and destroyed their church in the 1640s. The Spanish feared rebellions and tried to maintain their authority and suppress the Pueblo religion. In the 1660s there were unstable environmental conditions in the Rio Grande, straining the Pueblo people's reliance on irrigation agriculture and leading to famine. The Spanish relied on the Pueblo people for food and demands for it caused Pueblo communities to starve during the drought. These years of strife and tension culminated in the seventeenth century when the Indigenous people organized a revolt against their Colonial oppressors.

The 1680 Pueblo Revolt began in the north on August 10, 1680, initiated by the leader Po'pay from Ohkay Owingeh with allied Pueblo, Navajo, and Apache forces participating in the rebellion against the Spanish. There were several other smaller attempts of rebellion prior to 1680, but those were not successful. The Spanish accounts suggest that Po'pay was some sort of leader, perhaps a war captain, that was visited by an apparition or a messenger who relayed that the Spanish must die. Accounts suggest different versions of the prophecy and apparition or apparitions that spoke to him, but all have the same common thread that the Pueblo people would be better off without the Spanish oppressors (Hackett and Shelby 1942; Liebmann 2012). Although it is not clear what was said, the prophetic message was at the heart of the Pueblo Revolt and Po'pay was viewed as a prophet who would return the Pueblo people to a time of Pueblo governance. The Spanish feared an uprising and blamed the Revolt on satanic forces. Po'pay preached a unified Pan-Pueblo resistance movement. To coordinate a planned date for the Revolt, Pueblo runners went to the different pueblos with knotted cords. The number of knots in the cords suggested the proposed date for the Revolt and when all the knots were untied that was the day of the Revolt. Accounts suggest that the Pueblos tried to keep the revolt a secret. More specifically in the Middle Rio Grande, prior to the Pueblo Revolt, only four Southern Tiwa pueblos remained, including Sandia, Alameda, Puaray, and Isleta. Of these, Isleta did not participate in the initial stages of the revolt as it had not received word and because it was a central place for Spanish officials (Barrett 2002:92). It is of note that not all the Pueblos agreed with the planned revolt, and especially the secular leaders who had been appointed by the Spanish and felt that the revolt was mutinous.

The Pueblo Revolt temporarily drove the Spanish out of New Spain until 1692 when they returned. After the Spanish were forced out, there was variability in response to the absence of the Spanish among and within different Pueblo communities. Some desired a shift to traditional lifeways while others incorporated newly formed aspects of Spanish life into their daily lives, the result of which was a new shared identity (Gruner 2014; Preucel 2002; Wilcox 2009). There was variability among the Pueblos regarding what Spanish items were kept or destroyed. For example, at Sandia Pueblo, the people destroyed the statue of St. Francis by hacking the arms off it with an axe (Hackett and Shelby 1942:177-178). The most iconic artifacts destroyed after the revolt were the mission bells, since they signified Spanish religious oppression. Other villages left mission structures and ecclesiastical paraphernalia intact, however. For example, the mission of Santo Domingo was left unharmed. Other changes that occurred included the widespread appropriation of Spanish-introduced foods, building styles, and changes in pottery types produced. These examples illustrate that there were different degrees of revivalism among the Pueblo people after the initial Spanish occupation. While the listed examples can be seen in the archaeological record, several researchers note that many aspects of the Pueblo Revolt nativism movement are less evident in the archaeological record and are rather visible in oral traditions (Liebmann 2012; Preucel 2002). It should be noted that these revivalist practices were heterogenous in their development and presence among the many Pueblo communities. It could be said that the Pueblo Revolt of 1680 can best be understood less as a singular event and more as the sum of a multitude of individual, unique revolutions within each Pueblo.

Numerous archaeologists have published on the Pueblo Revolt and the response of the Pueblo people (Capone and Preucel 2002; Gruner 2014; Liebmann 2012; Preucel 2002; Wilcox 2009). Archaeologists have researched pottery motifs to see if designs were impacted by the Spanish or if they show signs of resistance to the Spanish (Capone and Preucel 2002; Mills 2002; Mobley-Tanaka 2002). Less research has been conducted on the Middle Rio Grande and its influence on the Pueblo Revolt since most of the pueblos were depopulated and destroyed during the Spanish occupation and retreat from New Mexico.

There were several unsuccessful Spanish attempts to regain their territory, including New Mexico governor Otermín's failed attempt. After 12 years of exile, the Spanish regained their territories in New Mexico under Don Diego de Vargas' brutal but successful conquest. In July 1692, de Vargas led Spanish forces to the territory near present day Santa Fe where he demanded that the Pueblo people surrender, and he promised clemency if they would return to their Christian faith and swear allegiance to the King of Spain. Through surprising acts of restraint in his treatment of Pecos, de Vargas was able to successfully limit continued acts of revolt as he led Spanish forces into conflict with at least thirteen different Pueblo villages (Kessel 1979:249). De Vargas also began exacting tribute from all Pueblos, with any resistance threatened by Spanish military forces. While Spanish officials labeled de Vargas' efforts as bloodless and heaped praise on his diplomatic successes, internal conflict among Indigenous groups in New Mexico and the rapid departure of Spanish forces back to El Paso after the reconquest suggest a more complicated narrative occurred (Liebmann 2012).

A significant material culture development after the Pueblo Revolt was the termination of the production of Glaze Ware pottery. Researchers have proposed that several impacts from Spanish colonization of the area were the cause for the decline of Glaze Ware pottery, including the dissolution of pottery apprenticeships, turmoil within and among Puebloan communities, and decreased ability to access lead rich deposits (Snow 2012).

In addition to significant material culture changes, the Pueblo Revolt and the Spanish response thereto resulted in a different understanding between the Spanish and Indigenous New Mexico groups. The subjugation of Pueblo people to heavily exploitative practices such as the *encomienda* and *repartimiento* systems was no longer tolerated, enabling Pueblo communities to persist with their own ritual practices and community-based economic systems.

Ethnographic Interpretations of Puebloan Motifs

Pueblo cosmology is best perceived as an all-encompassing division of the world into multitiered related planes. An important visible aspect of Pueblo cosmology is the depiction of key motifs, symbols, colors, and the organization of designs. Important motifs include birds, stepped and terraced elements, triangles, kachinas, awanyus (serpents/dieties), and the planet Venus. Starting with the Glaze Ware series in the fourteenth century, bird motifs and stylized versions thereof became relatively consistent in their depiction and their occurrence. Birds play a vital role in Pueblo religious ceremonies because they have a unique position in Puebloan cosmology, linking the three realms of water, earth, and sky (Swentzell 1990). Birds are also associated with the six directions that make up the Pueblo world and the different colors that characterize these directions. Feathers are used on kachina masks, clothing, fetishes, and prayer sticks. Bird imagery is depicted on pottery in kiva murals and carved in stone. Birds play an important role in Pueblo myth and song. Birds played a major role as religious icons in the kachina religion.

Based on kiva murals, ceramics, and faunal data from Hummingbird Pueblo and Pottery Mound, the ritual significance placed on birds by modern Pueblo groups in central New Mexico can be traced back to the 1300s. According to ethnographic accounts, many Pueblo groups procured birds for their feathers (Bunzel 1972; Parsons 1925, 1939).

The feathers of multiple species of birds were incorporated into ritual paraphernalia such as prayer sticks. The majority of the bird species used for feathers were not eaten except for the domestic turkey (Eckert and Clark 2009). The most religiously significant birds are raptors, turkeys, macaws, and parrots. Spanish accounts and archaeological studies indicate that turkey husbandry was widely practiced in the Rio Grande region. Birds such as macaws and hummingbirds were associated with rain and rainbows because of their tails and iridescent feathers that reflected water. In kiva murals, such as those at Pottery Mound, birds are often depicted in association with water vessels and rain, and feather imagery appears on clothing, in headdresses, hair, and attached to wands led by dancers (Eckert and Clark 2009).

Two related important motifs are stepped and terraced elements which are found in multiple contexts including pottery, rock art, and architecture. These motifs have traditionally been interpreted as representing rain or clouds and associated with fertility (Naranjo and Swentzell 1989). These motifs are also found on stone pipes and associated with cloud blower ceremonies, and some kiva fire deflectors were carved into the motif. Terraced elements are the most obvious and clearly representative of the rainclouds that build during the summer monsoons, bringing vital rainfall for crops. Stepped elements often represent halves of terraced elements or variations thereof, and often occur within design bands. Triangles and variations of stylized triangles are associated with rain, clouds, and birds as well.

Kachina imagery plays an important role in Pueblo cosmology. Kachinas are supernatural deities that are associated with water and live in the clouds (Schaafsma 2000) and are depicted as masked figures or a kachina-associated form on pottery, wood carvings, and kiva murals. Kachina masked dancers are frequently associated with rain since they are part of the rain bringing ceremonies. Kachinas are associated with clouds (and stepped and terraced elements) since they are said to be clouds according to Pueblo oral traditions.

Awanyu or horned- or plumed-serpent iconography has been present since the mid-Developmental period. There is no exact interpretation of an awanyu, but horned serpents are thought to be water serpents and gods found primarily at springs. Awanyus are most common on Biscuit A and Biscuit B pottery in the Northern Rio Grande (Graves and Eckert 1998:271). They have been interpreted as being associated with water and are said to live in the water underworld. Springs are viewed as connections between the physical world and the underworld.

The Venus star complex motif in the Southwest is thought to represent the Morning Star and hypothesized to have originated in Mesoamerica where it is known as *Tlahuizcalpantecuhtli* and more commonly in the guise of Quetzalcoatl (Mathiowetz et al. 2015). In its common paired form, the Venus star motif is painted in association with a horned or plumed serpent as at Pottery Mound (Crotty 1995; Schaafsma 2007). Based on rock art in the Northern Rio Grande valley and ethnographic data predominantly from Western Pueblo groups, some scholars argue for a strong link between the use of the Venus star motif and the scenery of conflict (Mathiowetz et al. 2015; Schaafsma 2000). Venus star motifs typically have four points, although some variations closer to a plus sign, or what Spanish may have recognized as a cross-like form, are known.

The motifs discussed here are important to the Pueblo worldview and way of life. Motifs associated with rain and water are interpreted as representative of the Kachina religion and necessary for Pueblo rituals. Prior to Spanish contact, Pueblo people used various motifs to decorate their vessels including both figurative and geometric designs. Ceramics were the main media for Pueblo community members to view and interact with these motifs. Combined with contemporary ethnography, archaeologists can interpret pottery images and their relation to Pueblo worldview in the past.

Methods

For this study I analyzed 289 partial and complete Middle Rio Grande vessels identified as Glaze Wares A-F from collections curated at the Museum of Indian Arts and Culture and from published sources such as from Pottery Mound (Eckert 2008). Vessels come from both professional and avocational excavations at Classic period and early historic sites in the Middle Rio Grande, although no data is included from southern Middle Rio Grande villages near Socorro. This means that because of biases by collectors and early professional excavators, bowls and larger jars associated with communal events such as feasting may be overrepresented. Furthermore, vessels with more ornate or unusual decorations may have been more likely to be collected or curated as display pieces.

I performed visual analysis on each vessel and identified vessel form and painted motifs. Photographs from all sides of a vessel were taken to enable later identification of motifs. The vessels selected for analysis were based on desired traits, availability for study (i.e., not in temporary repair or on loan elsewhere), and known ceramic type of provenance. All pertinent metadata regarding individual vessels were recorded and improved date ranges or typing was undertaken based on more recent work by Eckert (2006). Standard vessel form categories such as bowls, jars, etc. were employed to enable comparability.

Motifs were classified following Seltzer (2017) and I also determined whether the glaze paint displayed runniness. Motif classes were designed to be descriptive and not interpretive. Consequently, motifs that other scholars have interpreted as representing specific species of birds (i.e., macaws, parrots, turkeys, ducks, etc.) were categorized under the sole label of bird, although I evaluate whether different birds were likely depicted. Different motifs were recorded as present or absent on each vessel. Analyses were conducted with ceramic types aggregated by time period. I employed combined groups of Glaze Ware rim forms (Glaze Ware A-F) to enable comparability across Glaze Ware types and to assess differences during the Contact period. Temporal association for specific ceramic types were combined into three general periods: Pre-Contact period (pre-1500; or Glazes A-D), Early Contact period (1500-1600; or Glaze E), and the Late Contact through Revolt period (1600-1700; or Glaze F). The objective was to identify differences in vessel form, motif types, motif forms, and runniness over time to identify the impacts of Spanish contact and colonization on the primary material good manufactured by an Indigenous society.

Results

The analysis of the 289 vessels resulted in several results that support previous interpretations, as well as several interesting suggestions that pose intriguing follow-up questions. The first research question was to identify diachronic changes in vessel form within the assemblage (Table 1).

Most vessels in my sample date to the Pre-Contact period, followed by the Late Contact/ Revolt period, and then a moderate sample from the Contact period. This was expected given the limited excavation of sites dating to A.D. 1550 to 1700. The majority of analyzed painted vessels were bowls, followed by jars, with a diachronic shift away from vessel assemblages dominated by bowls (Figure 4a-c). The presence of more unique vessel forms

Table 1. Results by vessel form with percentages in parentheses.

Time period	Bowl	Jar	Canteen	Cup	Puki	Soup Plate	Total
Pre-Contact	131 (80.1)	33 (19.9)	1 (0.6)	1 (0.6)	--	--	166
Early Contact	33 (70.2)	10 (21.3)	3 (6.4)	1 (2.1)	--	--	47
Late Contact/Revolt	38 (50.0)	23 (30.3)	2 (2.6)	10 (13.2)	2 (2.6)	1 (1.3)	76
Total	**202**	**66**	**6**	**12**	**2**	**1**	**289**

a

b

c

Figure 4. Vessel forms identified in the study: (a) Glaze F soup plate, San Marcos Glaze-on-red (Catalog No. 21692); (b) Glaze C canteen, Espinosa Glaze polychrome (Catalog No. 21375); (c) Glaze D jar, San Lazaro Glaze polychrome (Catalog No. 21301). Images not to scale. Courtesy of the Museum of Indian Arts and Culture, Museum of New Mexico, Santa Fe, New Mexico.

(canteens, cups, puki, and soup plates) increased during the Early and Late Contact periods (Figure 4 a, b). Corresponding with the increase in vessel forms was an overall decrease in the number of different motif categories painted on vessels, with Pre-Contact vessels averaging 3.81, Early Contact vessels averaging 3.00, and Late Contact vessels averaging 2.64 motif categories per vessel.

A second research question focused on differences in design selection for bowls and jars. It was anticipated that there would likely be a difference in what types of designs were painted on bowls as compared to jars given visibility and use differences between the two. A comparison of my data does not suggest there are any large-scale differences in terms of design motifs painted on bowls as compared to jars, nor are there significant differences over time (Tables 2 and 3). Overall, designs for all Middle Rio Grande painted vessels include avian, geometric, and non-motifs, such as framing lines, in relatively equal proportions, with far fewer vessels displaying kachinas or identifiable zoomorphic depictions.

Table 2. Motif categories on Middle Rio Grande valley bowls.

	Pre-Contact	Early Contact	Late Contact/ Revolt
Avian	161 (30.9)	23 (20.0)	33 (31.4)
Geometric	152 (29.2)	28 (24.3)	28 (26.7)
Religious	25 (4.8)	6 (5.2)	5 (4.8)
Zoomorphic	14 (2.7)	4 (3.5)	2 (1.9)
Lines	169 (32.4)	54 (47.0)	37 (35.2)
Total	**521 (100.0)**	**115 (100.0)**	**105 (100.0)**

Table 3. Motif categories on Middle Rio Grande valley jars.

	Pre-Contact	Early Contact	Late Contact/ Revolt
Avian	46 (35.4)	8 (28.6)	27 (37.5)
Geometric	42 (32.3)	11 (39.3)	18 (25.0)
Religious	3 (2.3)	1 (3.6)	2 (2.8)
Zoomorphic	5 (3.8)	0 (0.0)	0 (0.0)
Lines	34 (26.2)	8 (28.6)	25 (34.7)
Total	**130 (100.0)**	**28 (100.0)**	**72 (100.0)**

To assess the impact of Spanish colonization in domestic settings, I examined how designs that the Spanish identified as ritually significant to the Pueblos changed in terms of presence on bowls and jars over time. This assessment follows previous research by Barbara Mills (2002) who looked at Hawikuh Glaze Ware vessels from Zuni. Mills argued that kachina motifs were more commonly painted on the interior surfaces of bowls than jars, as bowl interiors are more privately viewed. In contrast, Mills suggested, exterior jar decorations were more readily visible to group outsiders and were often decorated solely with geometric designs. My results do not support this conclusion, or at least not for the Middle Rio Grande, as nearly all the kachinas I identified on bowls were painted on the exterior surfaces. Kachinas were noted in similar proportion on both bowls and jars during the Pre-Contact period but are nearly entirely absent from the Early and Late Contact assemblages. Furthermore, awanyus are nearly absent within my assemblage save for four Pre-Contact bowls and one Late Contact/Revolt jar. In contrast, more abstract plus sign/Venus star motifs increased in proportion from the Pre-Contact through Late Contact assemblages and occur in similar amounts on both bowls and jars during the Early Contact period (Table 4).

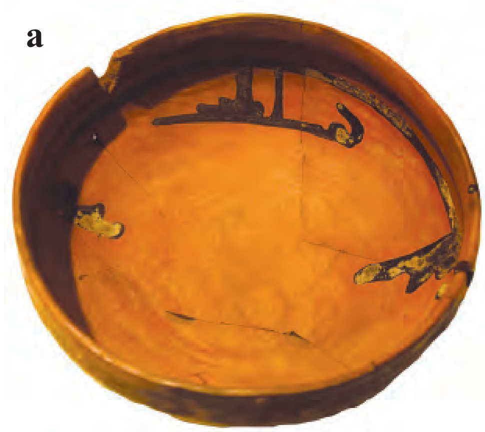
Table 4. Percentages of overtly religious motifs on bowls and jars.

Time period	Awanyu		Kachina		Venus Star	
	Bowls	*Jars*	*Bowls*	*Jars*	*Bowls*	*Jars*
Pre-Contact	0.8	0.0	1.4	1.5	2.3	0.7
Early Contact	0.0	0.0	0.8	0.0	3.3	3.2
Late Contact/ Revolt	0.0	1.2	0.0	0.0	4.3	1.2

Middle Rio Grande vessels with runny glaze paint were relatively uncommon in my sample, with only 14.5 percent of vessels displaying runny glaze. The runny quality is the result of including enough flux material (such as copper or lead which have low melting temperatures) to provide glossy finishes but firing the vessel at temperatures above these lower melting temperatures. Differences were present with the increased occurrence of runny glaze paint over time in a relatively exponential pattern. Only 3 percent of Pre-Contact period vessels had runny paint as compared to 7.1 percent of Early Contact period vessels and a far greater 35.5 percent of Late Contact period vessels.

The final component of the study was to assess how Pueblo potters depicted birds, given the extensive ethnographic and archaeological data demonstrating the significance of birds to Puebloan lifeways and ritual practices (Figure 5a-c; Table 5).

a



b

c

Figure 5. Examples of avian motifs on Glaze Ware pottery: (a) Glaze E bowl, Puaray Glaze polychrome (Catalog No. 42950); (b) Glaze D jar, San Lazaro Glaze polychrome (Catalog No. 21223); (c) Glaze D bowl, San Lazaro Glaze polychrome (Catalog No. 21523). Courtesy of the Museum of Indian Arts and Culture, Museum of New Mexico, Santa Fe, New Mexico.

Table 5. Number and percent presence of avian-associated motifs in sample.

Motif Type	Pre-Contact	Early Contact	Late Contact/ Revolt
Bird	58 (8.9)	12 (8.4)	20 (10.0)
Feather	13 (2.0)	0 (0.0)	4 (2.0)
Triangle	99 (15.2)	14 (9.8)	32 (15.9)
Feathered Key	36 (5.5)	3 (2.1)	10 (5.0)

A comparison of specific motif types associated with birds shows some interesting trends. Full depictions of birds, as were commonplace in the Middle Rio Grande within rim bands, remained relatively similar in proportion from the late prehispanic through the Late Contact period. Clear depictions of feathers remained highly uncommon on vessels. In comparison, triangles and feathered keys were present in similar proportions during both the Pre-Contact and Late Contact periods, but notably decreased during the Early Contact period. This may be a result of sampling bias or may fit into the broader trend of a decrease in avian-associated motifs during the Early Contact period, followed by an increase.

Discussion

This study resulted in several anticipated and unexpected conclusions. During this research, one anticipated result was that vessel form types would increase in diversity over time. This assessment was based on excavations at sites dating to the seventeenth century such as at Paa-ko and sites in the Northern Rio Grande like Yunque'owingeh (Ellis 1989; Lambert 1954). Notably, the few early historic components that have been excavated showcase the development of new European-inspired vessel forms such as soup plates and teacups, commonly referred to as colonoware forms (Creamer 2000; Larson et al. 2017:100).

Colonoware types included candlesticks, teacups, baptismal fonts, and soup plates yet they were produced by Pueblo potters and were often decorated using glaze and other traditional paints. Colonowares were meant to replace Spanish imported vessels, (i.e., majólica) and were readily available. In New Mexico, colonowares are found in broader contexts than solely missions and were used by both Spanish and Pueblo peoples. Soup plates were the most common colonoware form produced at Yunque'owingeh.

The results of my study, which included assemblages from a multitude of sites, many lacking reports, identified a similar trend. The Pre-Contact assemblage was dominated by bowls and jars. It is likely this trend would be even greater if unpainted vessels had been included in my study. The Late Contact assemblage, in contrast, included 10 cups as well as pukis and soup plates. Furthermore, previous studies noted the production of a new Glaze Ware vessel form during the early fourteenth century—the olla. The production of Glaze Ware ollas is associated with increased distance and quantity of exchange between communities, with individual ollas likely transporting dry goods and storing water (Habicht-Mauche 1993:47). The vessel form most associated with Glaze A and other Pre-Contact Glaze Ware types was also present in the Early Contact period, although most Late Contact period jars were oblong shaped with low shoulders (Frank and Harlow 1974). These attributes indicate most Late Contact period jars in my study were employed for water storage and not the exchange of dry goods. This shift suggests an unseen impact of colonization in my assemblage—the decline of Indigenous exchange networks (Barrett 2002; Habicht-Mauche 1993). Lastly, the occurrence of soup plates and other European-inspired forms in my study demonstrate the adaptive responses by Indigenous groups to Spanish colonization.

Another anticipated trend was a decrease during the Contact period in overt religious icons, such as kachinas, due to increasing social pressure or direct banning of non-Christian religious practices and symbols. My study did not identify changes over time in terms of general, obvious religious iconography on Middle Rio Grande vessels, but specifics for three main religious motifs did change. For instance, awanyus are almost absent within the assemblage as compared to a synthetic study that investigated Northern Rio Grande vessels (Seltzer 2017). Kachinas, while rare on vessels, were most common on Glaze A and other Pre-Contact vessels, with only a single known Early Contact kachina depicted. While the sample sizes for Pre-Contact, Early Contact, and Late Contact are not equivalent, at least a few more kachinas should have been found in the Early and Late Contact period assemblages if kachinas were painted in a similar proportion prior to Spanish colonization. The last overtly religious motif was the Venus star, commonly depicted as the plus-sign, and is a motif well documented on Rio Grande rock art, pottery, and kiva murals (Mathiowetz et al. 2015). This motif is often related to symbols for conflict and its increase into the Contact period may relate to increasing strife among Pueblo, non-Pueblo, and Spanish groups, as well as between different Pueblo communities (Liebmann 2012). As this analysis focused on motifs at the larger scale of analysis, it is possible that the transition from iconic Classic period Venus motifs (see Crotty 1995) to more cross-like forms may have been tolerated by the Spanish. Frank and Harlow (1974) noted that designs on Glaze Ware vessels produced inside or near Spanish missions often incorporated simplified or abstract designs to obfuscate any Indigenous ritual implications.

The incorporation of the Pottery Mound assemblage was expected to bias the data, given the suspected and well-supported Western Pueblo presence at the site (Eckert 2008; Schaafsma 2007). However, while Pottery Mound vessels included birds and other imagery in a way uncharacteristic to other Middle Rio Grande communities, the actual proportions of motif types depicted were similar to those communities in this study (see Eckert 2008 for Pottery Mound vessel depictions). Furthermore, as most Pottery Mound vessels were Glaze A types, with only two Glaze C vessels, they were readily compared against the largest sample of vessels in the study. Vessels that showed the most deviation in terms of how individual motifs were depicted were Pottery Mound Polychrome, a type related to Hidden Mountain Polychrome, and known to be heavily inspired by Western Pueblo artistry (Eckert 2008).

An examination of avian-associated motifs did not identify stark shifts between the late prehispanic through Pueblo Revolt period; however, there is a subtle decrease during the Early Contact period that is followed by an increase in avian-associated motifs during the Late Contact period. While this may partially be the product of a small Early Contact period sample, it likely is indicative of an intentional shift away from more overt religious icons such as kachinas towards associated symbols such as birds and the feathers they produce. As feathers are commonly used in kachina-related ceremonies, the replacement of kachina motifs with less overt avian motifs may have provided an opportunity for Pueblo potters to continue to mark and display symbols of their identity. These inferences are in line with work by Capone and Preucel (2002) and Liebmann (2012) who argue for newfound importance of four motifs during the Pueblo Revolt—feathers, the hooked triangle-F figure design, the double-headed or s-shape key, and the cap steep/sacred mountain motif. All of these appear on pottery produced in the northern New Mexico Pueblos during the Pueblo Revolt and borrow from symbols more commonly painted on Glaze A and B types (Capone and Preucel 2002).

Conclusion

The arrival of the Spanish into New Mexico in 1540 resulted in drastic, long-lasting impacts on Puebloan communities. With direct colonization in the seventeenth and eighteenth centuries, Spanish authorities restricted and outlawed many aspects of Pueblo traditional lifeways and ritual practices. Nevertheless, Pueblo people continued using traditional designs during Spanish occupation, also adapting new symbols of power and new technologies. The significant Pueblo Revolt of 1680, driven primarily by Tewa Pueblos, enabled the preservation of traditional ways of life and practices and forced the Spanish to adopt less exploitative stances to Indigenous groups. While some groups returned to Pre-Contact and early Contact lifestyles during the Pueblo Revolt, not all groups did, and the particular ways groups reinitiated the use of kivas, the Kachina religion, and settlement systems were highly variable (Liebmann 2012). As a result, the Pueblo Revolt is best understood as a dynamic expression of cultural hybridity between traditional Puebloan and new Spanish practices, rather than the single event of cultural revitalization that is often depicted. Evidence of this cultural mixing is found in the use of Spanish ecclesiastical garb, architectural styles, vessel forms and designs, and religious practices (Gruner 2014).

This study investigated changes in vessel form and painted designs on Middle Rio Grande vessels during the Classic period through the Pueblo Revolt. I sought to assess the impacts of Spanish colonization such as restrictions on the display of Pueblo religious iconography and the adoption of new European vessel forms in the archaeological record. Previous studies identified the development of colonoware as a main impact of Spanish colonization on Pueblo technology along with the curtailing of Puebloan religious iconography. My results support the former trend as new vessel forms, such as soup plates, appeared and increased through the Contact period. In contrast, the assertion that traditional Puebloan religious designs were severely curtailed was not supported. While some motif types did decrease in frequency, for the most part the Spanish did not replace Puebloan motifs on pottery. For instance, no Christian crosses or other clearly Spanish motifs were identified in the sample. Rather, motifs that the Spanish may have interpreted as crosses show remarkable continuity from the late prehispanic through the Pueblo Revolt period. Similar trends are seen in the shifts in motif categories from the late prehispanic to the Early Contact and Late Contact periods, such as in changes in avian-associated motifs. Pueblo people adopted a variety of Spanish domestic practices, as evidenced in the adoption of new vessel forms, crops, technologies, and the eventual integration of Christianity into Puebloan practices as seen in contemporary feast days. Yet, they did not incorporate Spanish religious practices or motifs into their pottery repertoire. Consequently, the results of this study reaffirm the many ways in which Pueblo communities actively persisted against Spanish colonization and maintained important aspects of their identity.

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Coronado's Invisible "Allies": The *"Indios Amigos"*

DAVID H. SNOW

Recent recovery of a crossbow bolt head (quarrel) and other diagnostic items outside the walls of Kuaua Pueblo (a.k.a. Coronado State Monument) reminds us of the interest of many historians and archaeologists in identifying the "footprints" of Vázquez de Coronado's epic 1540-1542 expedition through the Pueblo worlds and beyond. With few exceptions, identification of those footprints has relied on recovery of the appropriate sixteenth-century metal hardware carried by the expedition's Spanish members. Those bits and pieces of armor and accessories, characteristic horseshoe nails, and quarrels have been identified at several sites, particularly those in which hostilities occurred between Coronado's contingent and local Pueblos. Aside from such diagnostic European materials, we should also expect to find the bits and pieces of native weaponry, "*armas de la tierra,*" believed to have been carried not only by Coronado's native Mexican "*indios amigos*"—a term discussed in detail later—but also by most of the Spaniards identified in the expedition's 1539 *alarde* (muster role). Nevertheless, such bits and pieces of "native arms of the country," with but a single exception, have so far eluded those seeking additional footprints of Coronado's epic *entrada*. Consequently, the *indios amigos* with the expedition, alas, remain all but invisible in the archaeological record, as Richard Flint (1997:63-64) observed a number of years ago.

"Arms of the Country," "Native Weapons," and "Native Arms and Armor"

First brought to the attention of historians by Aiton's (1939) translation of the *alarde* of the Spaniards and their equipment with Coronado's expedition, the *alarde* was translated anew by Hammond and Rey (1940:87-108) for the Coronado Cuarto Centennial Commission volume and again by Richard Flint and Shirley Cushing Flint (2005:135-163), who also have provided the document's original Spanish text. Including horsemen and infantry, the muster provides the names of 289 men who volunteered for the expedition together with their equipment. In addition, the Flints have identified another 69 individuals absent at the muster whose equipment we are ignorant of; nor do we know to what extent, if any, the religious personnel, personal servants, and assorted others with the expedition, including *indios amigos*, might also have been armed.

Of the equipment, primarily weapons and armor identified in the *alarde*, 90 percent (260 of 289) of the men carried *armas de la tierra*, translated by Aiton as "arms of the country" but translated somewhat differently in later accounts. Aiton (1939:14, emphasis added) identified Alonso de Canseco's "equipment," for example, as "three horses, a coat of mail, a buckskin jacket, *arms of the country.*" Hammond and Rey (1940:90, emphasis added) rendered this as, "Alonso de Canseco, three horses, one coat of mail, one buckskin coat, *native weapons.*" The Flints (2005:140, brackets in original, emphasis added) wrote, "Alonso de Canseco…three horses, a [chain mail] vest, an elk hide jacket, [and] *native arms and armor*."[1] In each of these translations we are to believe the Spaniards all carried native Mexican weapons identified by Richard Flint (1997:62, parentheses in original) as "slings, lances, and *macanas* (obsidian-edged swords)," and he proposed that such "gear was certainly present in abundance with the Coronado expedition, since not only the Indian allies, *but also nearly all the European members of the expedition, were carrying such articles*" (Flint 1997:62-63, emphasis added).

It must be assumed also that such native weapons included native bows and arrows (and see below). This rather curious claim by Flint is based on the repeated Spanish phrase in the *alarde* for a majority of the Spaniards, "*armas de la tierra,*" which Flint assumed refers to native Mexican Indian weapons. If we accept the interpretation that *armas de la tierra* carried by all the Spaniards refers to native Mexican weapons, then any such items recovered archaeologically along the trail, at the Zuni pueblos, in Tiguex, or on the Southern Plains cannot necessarily be attributed to the presence of some 1300 or more *indios amigos* (or as Flint has consistently referred to them, "allies") and they remain invisible in the archeological record.

If Flint is correct that the Europeans also carried characteristic native Mexican weapons in addition to their European arms and armor (occasionally identified in the *alarde* as "Castilian"), we must assume that a very substantial number of native Mexican Indian weapons were carried to and through the southwestern United States. In addition, then, to the occasional quarrel from the 20 crossbows listed and lead ball from the *arquebuseros*, we might expect that bits and pieces of Mexican Indian weapons carried by the native "allies" and their Spanish compatriots to be far more commonly reported than any of the European items. Moreover, we should expect bits and pieces of such native weaponry where members of the expedition, whether Spaniards, "allies," or both were engaged in hostilities in various pueblo communities, or where they were simply broken, abandoned, or lost along the trek to Cíbola and beyond. Nevertheless, only a single "bit"—a broken blade of Pachuca obsidian—has been recovered from all the identified Coronado encounters in the Southwest and adjacent Southern Plains.[2]

The *Indios Amigos*

Testifying before the Viceroy's *residencia* in 1547, Francisco Vázquez de Coronado stated, "1,300 Indians more or less, participated…in the expedition" (Flint 1997:60). Castañeda wrote that "about 800 Indians native to Nueva España accompanied the expedition" and that on the expedition's departure from Culiacán it consisted of "allies and servants, who amounted to more than a thousand persons" (Flint and Flint 2005:392), suggesting that additional natives must have joined the expedition as it made its way from the Valley of Mexico to Compostela (in the vicinity of today's Tepic, Nayarit) and thence northward up the coast (Flint 2008:58-59). Mota Padilla (1876:112, emphasis added) wrote that there were "*mas de mil indios e indias* de servicio" (more than a thousand Indian males and Indian women "of service"), leading Bolton (1949:57) to suggest that perhaps they were "with the army to serve as scouts, sappers, servants, herdsmen, horse wranglers, camp cooks, or in other occupations." Baltasár de Obregón was informed, nevertheless, that together with some 600 Spaniards were 3000 Mexican Indians in an assault on Pecos Pueblo, clearly an exaggeration on the part of his informant (Bravo 1997:269).[3]

Throughout Castañeda's and other accounts from the expedition, the native Mexican Indians are consistently identified as "friends," "*amigos,*" the word Coronado himself wrote in his letters and testimony. Winship (1896) translated "*indios amigos"* as "friendly Indians" for Spanish a*migos* does not translate as "allies" ("*aliados*"), in spite of the consistent use of the word "allies" by Richard Flint and Shirley Cushing Flint (and, before them, Bolton [1949]). Depending on circumstances and the occasion, friends, of course, might also be or become allies, just as allies might temporarily, as the occasion required, be or become friends, but the words are not identical in meaning nor are they not necessarily interchangeable. Flint's apparent efforts to equate "amigos" with "allies" throughout his translation is a dubious literary device intended, I suspect, to emphasize the presence of the native Mexican Indians as a "fierce company…of warriors" (see below), a device on a par with some of Castañeda's more blatant literary ploys (e.g., Snow 2021). "*Amigos"* was used throughout the sixteenth century, including in all the documents related to the Coronado expedition, simply as a convention that distinguished between friendly natives ("friendlies) and "*indios enemigos*" (hostile natives, "hostiles"). Thus, the term *"indios amigos"* does not imply they were joined with the Spaniards in mutual benevolence or intimacy, merely that they were not or enemies or otherwise hostiles.

Castañeda wrote that Viceroy Mendoza raised an "*armed force and the assembly of people began, in order to go to conquer*" the seven cities of Cibola of Fray Marcos de Niza's story **(**Flint and Flint 2005:389, emphasis added). Nowhere in the expedition's documents is there any suggestion, however, that the *indios amigos* were recruited for or were forced or expected to serve in any military capacity. Rather, as Flint (2008:61-62, my emphases) noted,

> Documentary evidence specific to the Coronado expedition says only that Lorenzo de Tejada, the *oidor* of the Audiencia of Nueva España, "spoke with the *caciques* of Santiago [and other native communities], telling them that since the Spaniards were going to Tierra Nueva *some of the Indians might also want to go of their own free will*." It is also known that at least some of the *indios amigos* were compensated by having their tribute temporarily reduced.

In spite of this, Castañeda's characterization of the expedition as an "armed force…in order to go to conquer" provides the Flints (2005:164, emphasis added) with a rationale for referring to those *indios amigos* as a "*huge and fearsome company of [native Mexican] warriors*…" Flint (2008:xiii) has written elsewhere that the expedition "intended to seize control of the people" of "La Tierra Nueva." Nowhere in the documents is that intention stated or implied! The implication, unstated by the Flints, is that the Viceroy's intention was one of a *military* conquest that anticipated warfare and conquest of defeated enemies, a notion that has captured the Flints' imagination. However, both the Viceroy and the Spanish Crown seemingly viewed the expedition primarily as an "adventure of discovery" and "spiritual conquest" (e.g., Flint and Flint 2005:108-10).

It would be useful to know just how many of the *indios amigos*, those "fearsome warriors", in the Flints' words (Flint and Flint 2005:164), "fully supported by slaves and servants… sometimes accompanied by wives and other female companions," actually were males. Nowhere is that information provided in any of the documents. Coronado's "successes" in quelling various hostile Pueblo peoples, wrote Richard Flint (1997:61), was owing to that "fearsome company of warriors" whose reputation "probably preceded them into the Southwest" (but probably not!). According to the Flints (Flint and Flint 2005:165) the "*indios amigos* were, most importantly, part of the fighting force of the expedition; their involvement in combat helps explain the ease with which most of the indigenous communities met were subdued or overawed into pro forma submission." Nowhere, however, in any of the expedition's documents pertaining to events at Hawikku, Tiguex, Pecos, or on the Southern Plains are the *indios amigos* identified as having overawed anyone into pro forma (or any other type of) submission. With but a single exception, there is no description anywhere in the documents that the "amigos" were involved in any of the hostile engagements involving Coronado's contingent and Pueblo or other native peoples.

Where Are Those *Amigos* in the Documents?

Castañeda's account tells us that "most of the *indios amigos*" comprised Coronado's advance party to Cibola late in July of 1540, together with some 50 or 60 cavalry and footmen. That the advance party may have "numbered 1,000 or more, principally Indians", apparently, is a figment of the Flints' imagination (Flint and Flint 2005:392), but they suggest that the "existence of the large corps of Mexican warriors in the Spanish-led force [at Hawikku] easily explains why it so quickly overran the pueblo" (2005:164-65, brackets added). Further, they claim that the large force of "allies" "…participated in the attack on Cibola in July 1540" (Flint and Flint 2005:135), when in fact, they did not, according to Coronado himself; nor do other descriptions of the encounter at Hawikku, mention any *indios amigos* participation, much less their presence on or near the field of battle (e.g., Flint and Flint 2005:256-258, 393).

Castañeda wrote (Flint and Flint 2005:392) that "most of" the *indios amigos* accompanied Coronado's advance party early in July of 1540 but this is not supported by other accounts. Coronado did not say how many Indians were with the advance party, only that he was "bringing" some "*Indiana amici*", that is, "friendly Indians" with him (the letter is from a later Italian copy by Giovanni Rasmusio; Flint and Flint 2005:252). According to the *Relación del Suceso*, Coronado left Culiacán with "eighty horsemen, twenty-five footmen, and part of the artillery…" and later mentioned only the "deaths of some Indians" with the party (Flint and Flint 2005:497). Juan Jaramillo recalled only that "sixty horsemen" went with Coronado and his advance party (Flint and Flint 2005:512). Coronado's August 3, 1540 letter to the Viceroy stated merely that some natives with the advance party were aided by corn obtained in the Señora valley but that "Some of our Moors and Indians ran away" because of the scarcity of food and difficult labor involved during the trip as far as Los Corazones that resulted "in no small deficiency among the servants for the enterprise." In the same letter, he wrote only that "some" *indios amigos* died along the way (Flint and Flint 2005:255-56). No mention is made anywhere of a large force of Mexican warrior allies, "some 1,000 strong" with the advance party as the Flints would like us to believe.

Describing the situation at Cibola, Coronado wrote that, upon arriving within sight of the "*ciudad*" (that is, the pueblo) of Hawikku, he sent several men ahead "so that the Indians might see them" as they recited the "*requerimiento*" through an interpreter (Flint and Flint 2005:257). He testified later that, "*He sent two Nahua Indians away with them [those from Cibola] carrying a cross in their hands as a sign of peace*" (Flint 2002:280, emphasis added). Two Nahua natives do not an intimidating force make! The Zunis, evidently unimpressed, let fly with an arrow, just as Coronado and his force arrived. Following some skirmishing and a retreat by the Hawikku natives into their pueblo, Coronado

> ordered that the crossbowmen and arquebusiers make an assault and remove [our] enemies from the defensive structures…I attacked the wall on one side at a place where they told me a movable ladder was leaning…in short order the strings of the crossbowmen's weapons broke, and the arquebusiers accomplished nothing… (Flint and Flint 2005:257, brackets added),

because they were so weak and debilitated from hunger, according to Coronado, that they could hardly stay on their feet. No "allies" here! Coronado himself was struck with stones thrown from the defenders and knocked to the ground twice before he was rescued by his men, and he summed up the casualties, noting that

> all these caballeros and men-at-arms acquitted themselves very well, as was expected of them…three other companions-in-arms were wounded. And three horses were killed. There were seven or eight other horses wounded, but now these men, and the horses as well, have recovered and are quite healthy." (Flint and Flint 2005:258)

No "allies", aside from the two Nahuas and an interpreter (from the "valley of Corazones") are mentioned in these accounts of the approach to and subsequent brief siege at Hawikku.

The only other description of the "allies" participating in the expedition is Castañeda's account of how Tiguex rose up in arms owing to the reported rape of a native Pueblo woman by a Spaniard who subsequently could not be identified by the woman's husband except by the man's horse he had been asked to hold. Although the horse was recognized by the aggrieved Pueblo man, this was deemed insufficient identification and he was sent away without redress for the reported assault. As a result, presumably,

> The next day an Indian from the expedition who had been guarding the horses came [to the pueblo of Tiguex] wounded and in flight, saying that the Indians of that land had killed a companion [of his] and had taken the horses and driven them toward their pueblos. [The Spaniards] went to gather up the horses, but many were missing, as well as seven mules belonging to the general. (Flint and Flint 2005:403; brackets in original)

Captain García López de Cárdenas, sent to investigate, found several of the Tiguex pueblos enclosed by palisades, in one of which was

> a great shout… [where they were] fighting the horses (as in a bullring) and shooting them with arrows. [They were] all up in arms. [López de Cárdenas] could do nothing because [the Indians] did not come out into the countryside Because the pueblos are fortified [the men-at-arms] could not [even] hurt them (Flint and Flint 2005:403, brackets added; see also Flint 2002:80).

A siege was ordered by the Spanish forces that took the pueblo by surprise, allowing the Spaniards access to the roofs:

> Our people were on top [of the roofs] for that day and night and part of the next day at great risk, making accurate shots with crossbows and arquebuses. The horsemen and many *allies from Nueva España in the space outside the pueblo started large, smokey fires [in] the ground-floor rooms* [into] which they had broken, so that [the Indians] sued for peace. (Flint and Flint 2005:403; brackets and emphasis added)

This is the sole reference in documents stemming from the expedition that mentions any participation by the Indian "allies" in an engagement with the Pueblos of Hawikku, Tiguex, Pecos (Cícuye), or on the Southern Plains!

Armas de la Tierra Revisited

In a section of his 1599 treatise entitled *Milícia y Descripción de las Indias* addressing the

Chichimecas of Zacatecas, Capitán Don Bernardo de Vargas Machuca (Vargas Machuca 1599:7, my emphasis) noted "*Que se juntan muchos españoles armadas ellos y los caballos con unas* mantas de algodón de tres dedos de grueso*, para que allí hagan presa las flechas que les tiraron los indios."* Translated, "Many Spaniards and their horses were gathered, with cloaks of cotton three fingers in thickness that the arrows shot at them by the Indians did not harm." Vargas Machuca also wrote that in the *Indias* (Indies), the Spaniards "*usan… sayas de* <u>*armas*</u> *hechos de algodon…*antiporras y morriones del dicho algodon (Vargas Machuca 1599:37, emphasis added). That is, "They used … tunics for armor made of cotton … eye guards [or visors] and helmets of the same cotton."

Similarly, Obregón's informant described the death of Capitan Alcaráz, during the Mixton War (1540-42) of saying that, "…*estaba el capitán acostado con dos indias los cuales le ayudaron a armar un* esquaquipil, arma de ropa de algodón, *y por entre las costuras y junta del esquaquipil le dieron dos flechazos de que en breve tiempo murió* (Bravo 1975:155; emphasis added). Translated, "…the capitan was lying down [and] with two Indian women [who] helped him [remove] his armor, an *esquaquilpil*, armor of cotton cloth, and at the seams near the *esquaquilpil* [the enemy] gave him two arrow shots from which he died a short time later."

Armas de la tierra, then, clearly refers, not to *macanas*, slings, spears, or even bows and arrows, but to body armor, contrary to the Flints' (1997:62-63; Flint and Flint 2005:138) translation. Despite their translation, Flint (1997:62) noted that Viceroy Mendoza's native allies in the subsequent Mixton Revolt "wore padded cotton armor…" (as Obregon, above, wrote!); and Juan de Cuebas, who performed the muster for Coronados' expedition, frequently used the term "armaduras *de la Tierra*,"[6] once describing it as *"de la cabeca dobladas*" (Flint and Flint 2005:152, 156), the latter translated by Flint and Flint (2005:156, emphasis added) as "native armor and *bent* head [armor]"! Aiton (1939:15, emphasis added; and see Hammond and Rey 1940:96) translated this correctly as "armor of the country and for the head *of double thickness*," calling to mind the description by Vargas Machuca: "*de tres dedos de grueso*…" ("of three fingers' thickness"). "To bend" is but one among the several meanings of the Spanish verb *doblar*, correctly translated "to double" by Aiton and Hammond and Rey.

As noted at the outset of this essay, the evidence for Coronado's "footprints" so far consist entirely of those bits and pieces of sixteenth-century "metalfacts," particularly copper and iron quarrels (*saetas*), recovered, for the most part, with the aid of a metal detector at several sites known or suspected to have been "visited" by the expedition's 18 *ballesteros* (crossbowmen; one, interestingly, carried two crossbows!). With few exceptions, to this writer's knowledge, the route of the expedition up the west Mexican coast and across southern Arizona into extreme southwest New Mexico and up to the Zuni pueblos has had to rely on identifying features on the landscape based on descriptions of the terrain and features described in the various accounts (e.g., Hartmann 2014; Hartmann and Hartmann 2011). Very few representative artifacts from the expedition's route through the Southwest have been recorded. Brasher (2011:218), however, reported a "number of iron artifacts consistent in form, function, and craftsmanship with sixteenth-century pieces, as well as two lead balls composed of Spanish lead" from the Kuykendall ruins in southeastern Arizona. Among his finds there, Brasher also reported an "iron crossbow bolt head". Interestingly, however, no hostile encounters in the general area are reported in the documents.

Brasher (2019) also has reported additional metal artifacts possibly reflecting the route of the expedition immediately east of the Arizona-New Mexico border suggestive of its course up to the Zuni pueblos (and see Brasher 2017), including at the former Zuni pueblo of Kechiba:wa, a short distance southeasterly of Hawikku Pueblo where a copper quarrel, and pieces of apparent chain-mail were located with the aid of a metal detector (Mathers et al. 2011:262-285). Survey of the Hawikku "battlefield" (Damp 2005) yielded a large number of suspected sixteenth-century metal fragments, such as nails, tools, a partial iron bolthead, and chainmail links (as well as more recent iron and steel items likely from the 1917-23 Hendricks-Hodge Archaeological Expedition; see Burgio-Ericson 2020). But no native Mexican Indian items are recorded from those surveys. Reflecting a portion of the expedition's route from Zuni to the Rio Grande province of Tiguex, chainmail and possibly other sixteenth-century metal items were reported by Mathers and Haecker (2011:286-307) from a metal-detector survey at El Morro National Monument. It was from El Morro that Coronado and a number of unidentified members of the expedition are believed to have turned south in search of the "Province of Tutahaco" (e.g., Riley 1995:170), perhaps reaching as far south as present-day Socorro, New Mexico (later called Pilabo by Fray Alonso de Benavides in his 1634 "Memorial"; Hodge et al. 1945:62), before turning up the Rio Grande to reach the recently established winter headquarters at the pueblo they called Alcanfor.

Of Castañeda's twelve or so pueblos of Tiguex (e.g., Flint and Flint 2005:418), only three have been firmly identified so far on the basis of the recovery of diagnostic sixteenth-century metal artifacts, particularly copper crossbow boltheads: Piedras Marcadas Pueblo (LA 290, Schmader 2011), Santiago Pueblo (LA 326, formerly known as "Bandelier's Puaray"; Snow 1976) and, most recently, Kuaua, at Coronado State Monument (LA 187; Mathers 2020). Because it is unlikely that the *indio* allies were supplied with crossbows, arquebuses, chainmail, or other Castilian armor and weapons, or personal gear requiring metal fasteners and clasps, the items recovered so far from those three pueblos as well as from Hawikku and Kechiba:wa, reflect the presence of Spaniards, *not native Mexican Indians*. Moreover, if the majority of Coronado's Spaniards also carried native Mexican Indian weapons, recovery of any such items *cannot be assumed, necessarily, to reflect the presence of the* indios amigos.

Clay Mathers (in Marshall and Mathers 2017:14)[4] reported recovery of a "finely-made Mexica-style" (or, as he later wrote, "Mexican-style"; Mathers 2020:178) projectile point of chert "with symmetrical side notches and a central basal notch" from survey of the field of conflict at Santiago Pueblo, believed to be the Pueblo Moho of the Tiguex war. Unfortunately, that artifact is not illustrated or further described. Vierra (1989:122) also reported the recovery of a "Texcoco" projectile point from nearby LA 54147, some 400 m from Santiago Pueblo, believed to have been a camp occupied by members of the Coronado expedition. Based on Vierra's description of the "Texcoco" point, Flint (1997:68) provided a line drawing comparing it with similar small triangular points from Texcoco, Mexico, and West Texas. As originally described by Tolstoy (1971:281), the Texcoco point is *not* basally notched, but Vierra's basally-notched "Texcoco" point of "*local chert*", apparently, is still considered a native Mexican product by Coronado aficionados (Vierra and Hordes 1997:259, emphasis added). Other than a piece of Pachuca obsidian blade from a *macana*, no other items clearly of Mexican native weapons or paraphernalia were recovered from LA 54147, nor, for that matter, anywhere north of the Mexican border!

Mathers' failure to illustrate his "Mexica-style" point leaves open the identity of "Mexica-style" (whatever that might be). Moreover, Tolstoy (1971:279) notes that his Texcoco points, "resemble the Harrell point of Texas", citing the original description by Suhm and Krieger (in Suhm et al. 1954), and that, "*Points similar to the Texcoco are widespread in late times in Mesoamerica*" (Tolstoy 1971:281, emphasis added). Vierra (1989:121-22) also remarked that Harrell points were widespread in the Southern Plains and Southwest. If by "Mexica-style" Mathers is suggesting a Texcoco point, it is

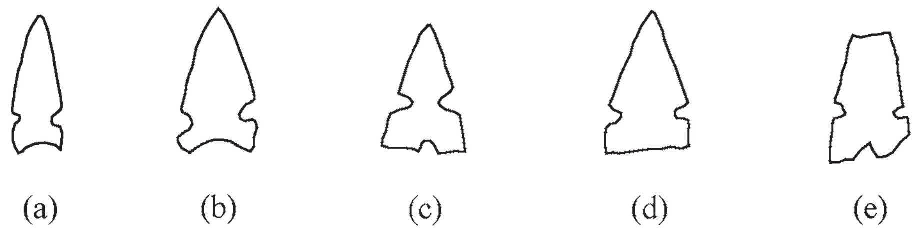

Figure 1. (a) Texcoco point (after Tolstoy 1971: 280, Fig. 3)
(b) Haskell point (after Duncan et al. 2007:61)
(c) Harrell point (after Duncan et al. 2007:58)
(d) Washita point (after Duncan et al. 2007:147)
(e) "Texcoco" point from LA 54147 (after Flint 1997:68, tip and basal flange broken)

just as likely that the Harrell-like point might well have been released by one of Moho's defenders against Coronado's siege, just (as Mathers suggested in Marshall and Mathers [2017:24]) as were the slingstones found in the "battle" zone at Santiago Pueblo. In fact, Tolstoy's "Texcoco" point now is referred to as a Haskell point (Figure 1), lacking the basal notch characteristic of Harrell points (Duncan et. al 2007). Forty-three Haskell, or "small Texcoco", points *without the basal notch* from the Valley of Mexico are illustrated in photographs by Guyah (2012:50 and photographs on pp. 101-102).

The original description of Harrell points cited by Tolstoy was subsequently redefined to address three related variations on the small triangular points frequently encountered on the Southern Plains:

> …small triangular notched points… originally described and named Harrell by Suhm et al. (1954:200) but this name was applied to two variants, one with a notch in the base and one without basal notching. Later, Bell (1958:30) suggested that the two types be separated with the term "Harrell" referring to the side and basally notched arrow points and "Washita" referring to the points without a basal notch (Duncan et al. 2007:55; and see Bell 1958:30 and Perino 1968:32).

Clearly, Tolstoy (among others) was unaware of the later division of Suhm and Krieger's original description into three related varieties, resulting in misapplication of the type name Harrell to the points described from central Mexico. Each of these three variations on the small triangular projectile points occurs in late Pueblo IV pueblos up and down the Rio Grande Valley (e.g., Hurt 1990:Plate 11; Kidder 1932:22, Figure 6; Lambert 1954:Plate xxxiii-c; Marshall 1987:83; Snow 1976:Section D, Figure D7; and Young 1981:Figure 133). Mathers' use of the term "Mexica-style" point from the Santiago "battlefield," I suspect, might well be a Haskell point lacking the basal notch and, therefore, attributed to "Mexica-style" following Tolstoy's original description. If this is the case, it is equally likely that it was discharged by a Santiago Pueblo native against the attacking Spanish forces, for such points are not uncommon in late Pueblo IV sites in the Rio Grande. Neither style constitutes irrefutable proof of the presence of Coronado's *indios amigos*, those "fearsome warriors."

Conclusion

The broken *macana* blade of Pachuca obsidian from nearby LA 54147, believed by many to reflect a campsite of Coronado's "*indios amigos*" continues to represent the sole piece of evidence for native Mexican weaponry found so far in Tiguex or elsewhere along the trail from West Mexico. The reader might (or might not) be surprised to learn that pieces and artifacts of obsidian from the Sierra de Pachuca are reported from prehistoric and historic contexts in Ohio (Steven Schakley, personal communication, November, 2020), as well as from sites in South and Southwest Texas, and at several prehistoric sites on the Southern Plains (Chris Lintz, personal communication, November, 2020). I have attempted here to correct the almost ludicrous assumption that the Spaniards arrived in Tiguex bearing (in addition to large numbers of "Castilian" arms and only an occasional piece of European armor) Native Mexican "bows and arrows, clubs, spears, light javelins, slings" (Flint 1997:62), as well as, perhaps, shields. Spanish *armadura* and *armas*, as explained in the citations by Vargas Machuca and used by Juan de Cuebas in the *alarde*, refer to items of protective armor with which those who go off to combat clothe themselves, as the dictionary definition explains: "*Armadura*: *conjunto de armas de hierro que vestian los que iban a combatir*" (Tory y Gisbett and Garcia-Pelayo y Gross, 1964:91-92); that is, "the ensemble of iron *armor* with which those who go into combat dress [clothe] themselves." Thus, "*armas*" refer, in the context of the *alarde*, to armor, not to *macanas*, bows and arrows, and so on. In the *alarde*, but few of the Spaniards were outfitted with "Castilian armor" of metal; the remainder dressed themselves with various items of clothing padded or quilted with *cotton* for protection against native arrows.

With but a single fragment of Sierra de Pachuca obsidian recovered over the distance of some seven or eight hundred miles more or less, we might expect that the "*indios amigos*" might have dropped *something* along the way as evidence of their having passed in such large numbers. In spite of the Flints, who would have us believe the native Mexican "allies," in large numbers, represented a "company of fierce warriors," we are left, as Bolton (1949:57) suggested, with the impression that they might have served primarily as "scouts, sappers, servants, herdsmen, horse wranglers, camp cooks… and other occupations." There simply is little evidence of their passing or of their presence in the surviving documents. That they apparently did not provide a fighting force alongside their Spanish "allies" (with the single exception recorded by Castañeda and mentioned nowhere else in accounts of the sacking of some eleven or twelve other Tiguex Pueblos!), is a curious omission in the subsequent inquiries into the expedition's activities in Tiguex (e.g., Flint 2005). "Fierce warriors" Native Mexican Indians clearly were, as Flint believes, but until we are able to determine just how many of the 1300 or so "*indios amigos*" were in fact male warriors, I suspect that Bolton's surmise is the more likely. That one or two were killed by Tiguex natives while guarding the Spaniard's horse herds, perhaps, is a telling indication that Bolton's surmise might be correct.

I have attempted to correct the mistaken impression of the Coronado expedition aficionados that "Texcoco" projectile points are, somehow, readily recognizable in the archaeological record in Tiguex. That Tolstoy (1971) was unaware of the earlier reclassification of Southern Plains Harrell points into three subtypes is unfortunate and has misled researchers into misidentifying a presumed "Texcoco" point from LA 54147. Both styles, Harrell and Haskell, are commonly reported from both prehistoric and early historic Puebloan occupations in the Rio Grande Valley.

Finally, the conclusions reached by Vierra from his excavations at LA 54147, based on artifacts recovered and, most importantly, from the presence of domestic sheep bones recovered (as well as other curious and, I believe, unsupported arguments from the data), are in serious need of review and additional research. If nothing else, the critical argument that only Coronado brought domestic sheep into New Mexico prior to the arrival of Juan de Oñate's colonists in 1598 is quite simply wrong, as Obregón's informant, a former member of the

1580-81 *entrada* by Chamuscado and Rodríguez, itemized: some "…*seiscientas vacadas de cabras, oveja y carneros*…" (Bravo 1997:288), that is, "600 head of goats, ewes and [other] sheep."

Notes

1. The 1540 *alarde* of Coronado's men reveals that many were equipped with "*una cuera de anta*" (Flint and Flint 2005:152-62), consistently translated by the Flints as "elk hide jacket". Elk, or Wapiti, is native to the northern latitudes in North America, but not Mexico! In Spanish, *anta* translates as the native northern European and northeastern Eurasian moose (*Alces alces*). Whether moose-hide jackets were exported to the New World prior to 1540 I doubt, and Aiton (1939), as did Hammond and Rey (1940), translated *anta* as "buckskin" although the more appropriate translation would be simply "thick leather". In New Mexican Spanish, *anta* does consistently mean elk hide, a commodity that comprised a valuable export to the interior during the Spanish Colonial period here.

2. A postcard with photographs of representative "Coronado era" artifacts (quarrels and obsidian *macana* blades) was prepared as part of a "Coronado Road Show" (Burgess 2011), but it was not stated that the items depicted were recovered archaeologically anywhere from along the trail of the 1540 Coronado *entrada*.

3. Winship (1896:378) wrote that Mendoza stated at the time of the *visita* in 1547, that "about three hundred Indians, a few more or less" were recruited from the valley of Mexico. Other native Mexicans likely joined the expedition as it moved westward through Michoacán, Jalisco, Nayarit, and north along the Pacific coastal regions (e.g., Flint 2008:59). Castañeda provided the number of *indios amigos* as "about eight hundred…native to Nueva España" (Flint and Flint 2005:389). Mota Padilla's (1876:112) 1300 "*indios e indias de servicio*" is not particularly unreasonable but more recent investigators inexplicably (incredibly?) have upped the numbers of native Mexican "allies" substantially to "some two thousand" (Mathers et al. 2011:264; Mathers and Haecker 2011:288). Similarly, in addition to Obregón's misinformation about 6,000 allies at Pecos, Bolton (1949:69) provided a curious claim that he attributed to Castañeda of some "five thousand" Indian allies at Pecos, but I am unable to find either number or a reference to such a force in Castaneda's "*Relación*" or in other documents.

4. Regarding the Santiago Pueblo (Moho) siege site surveyed and reported by Michael Marshall and Clay Mathers (2017), I am informed by Marshall (personal communication to the writer, October 5, 2020) that the report was entirely written by Mathers, who provided Marshall's name as the lead author out of courtesy for the latter's having obtained the necessary land ownership permission and permits for the survey. For this reason, I have referenced the work as that of Mathers throughout.

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Four Apophatic Theses on Chacoan Roads

ROBERT S. WEINER

I am delighted to have the opportunity to present some thoughts on Chacoan roads in honor of James Conder, whose efforts over decades to conserve New Mexico's archaeological heritage should humble and inspire us all. The topic of Chacoan roads is particularly prescient in a volume honoring someone who has dedicated so many years to the protection of ancient Southwestern sites.

Roads, perhaps more than any other large-scale archaeological feature in New Mexico, embody the fragility of Southwestern archaeological resources and raise thorny questions of how such features might be preserved. These subtle traces of once-great avenues crossing vast tracts of sagebrush and soil are glimpsed (usually) only from the air—and, at that, only in the fleeting hours of dawn and dusk. On the ground, we wander across trackless deserts, GPS units confirming we are in fact "on the road" as we scratch our heads in search of a sherd, road shrine, or any other hint of the 9-m-wide (30-ft) behemoth so clear in the satellite image on our digital screens.

Hints of a monumental past hidden among sagebrush and dust, Chacoan roads evoke challenges for archaeological interpretation and conservation—how, to quote the title of a 1980s presentation by John Stein, does one "manage the invisible?" In the pages that follow, I explore the approaches I am taking to coax meaning from the ephemeral traces of once-great avenues. My hope is that a greater appreciation of roads, facilitated principally by emerging technologies and novel interpretive strategies, will convey the importance of documenting them before they vanish—*and they are vanishing, minute by minute*. The combined forces of wind, weather, grazing, energy development, and our collective (perhaps unconscious) commitment to postponing further roads research make for intimidating opponents, but we must face these demons before the last fleeting remnants of Chaco's linear earthworks, like footprints on the sandy shore, disappear before our very eyes.

It seems appropriate, given the now-you-see-it-now-you-don't nature of Chacoan roads, to approach their study in an unorthodox manner; such slippery features do not lend themselves to conventional approaches and analytical strategies. As such, I will proceed by means of the logic of negation; we will see if, through a series of apophatic contentions, some dim but novel glimpse of the use and meaning of Chacoan roads reveals itself. But first, I present a brief overview of previous research for readers unfamiliar with Chacoan roads.

Background on Chacoan Roads

Chacoan roads are, briefly put, "*overbuilt* and *underused*" (Sofaer et al. 1989:368; italics in original), leading many researchers to question their designation as "roads" in the conventional sense of transportation corridors frequented for travel and trade. Monumental road-like features have been noted in association with Chacoan ruins since the late 1800s and early 1900s (e.g., Holsinger 1901:67–68). Small scale documentation, remote sensing, and trenching of Chacoan roads took place throughout the twentieth century A.D. (reviewed in Vivian 1983), but it was the possibility of coal mining throughout the San Juan Basin in the 1970s and 1980s that triggered large-scale investigation of Chacoan roads by the Bureau of Land Management (BLM). Phase One of the BLM project identified potential prehistoric roads within 10 miles (16.9 km) of Chaco Canyon using aerial photography, with intensive fieldwork on three of the longest Chacoan roads—the North, South, and Ah-Shi-Sle-Pah Roads (Kincaid 1983). Phase Two involved aerial reconnaissance and ground survey of 14 Chacoan roads, none of which received the same intensive documentation as conducted in Phase One.

The findings from Phases One and Two of the BLM Chacoan roads project, later summarized by Roney (1992), revealed common patterns. Chacoan roads maintain straight trajectories and ignore topographic obstacles (Nials 1983:6-27). Typical domestic architecture, camps, and hearths were not present along the roads studied by the BLM (Nials et al. 1987:25), and "sites found along the road alignment appeared to be the product of only extremely casual use" (Kincaid et al. 1983:9-74). Instead, shrine-like constructions called *herraduras* are the feature commonly found with roads (Nials et al. 1987:13). Of the 67 roads included in Roney's (1992) synthesis, 92 percent are less than 5 km (3 mi) in length, 57 percent are less than 1 km (0.6 mi), and over half could not be firmly associated with an endpoint (Roney 1992:Table 10-1).

Chacoan roads consist of shallow-to-deeply excavated pathways that average 9 m (30 ft) wide (Nials 1983:6-5). Many researchers have noted that the 9-m (30-ft) width of Chacoan roads far exceeds the requirements for a transportation corridor in a society without pack animals or wheeled vehicles (e.g., Friedman et al. 2017; Kantner 1997). Rock-cut steps, scaffolding (visible currently as postholes cut into the cliff side), and large earthen ramps are common features where roads ascend the cliffs of Chaco Canyon (Pattison 1981). Aside from these more visible elements, Chacoan roads have very subtle ground signatures due to 1,000 years of weathering processes. Traditionally, the most successful technique for detecting Chacoan roads has been analysis of low-sun-angle aerial photography with follow-up ground-truthing (Kincaid et al. 1983; Obenauf 1991). Roads are most visible on the ground as swales where they cross hills connected by linear sherd scatters in low areas between. But, in many cases, elongated linear scatters of ceramic sherds are the only ground traces of Chacoan roads. Concentrations of pebbles and small stones unearthed during road construction are found along some road margins, and subtle vegetation differences driven by greater moisture absorption within depressed roadbeds also mark road alignments.

Dating Chacoan roads has presented a major challenge to previous investigators. While associated Great Houses and sherds along roadbeds can be dated, these do not necessarily indicate the date of road construction. Ceramics from road-related Great House sites and roadbeds studied by the BLM date tightly to the late eleventh and early twelfth centuries A.D. (Nials et al. 1987:25). Despite this general trend, many roads also appear to have been constructed in the centuries following the decline of Chaco's centrality of influence in the Four Corners region, as well as before (Fowler and Stein 1992; see Thesis Three below).

Economic transport functions dominated interpretations of Chacoan roads prior to the BLM's in-depth road studies and are still favored by some researchers today (e.g., Field et al. 2019; Powers et al. 1983). Various aspects of Chacoan roads, however, are difficult to square with trade and transport functions. For one, they maintain uncompromisingly straight trajectories that ignore topographic obstructions such as hills, mesas, and canyons (Nials 1983:6-27). One commonly cited piece of evidence against transportation interpretations is Kantner's (1997) GIS analysis that determined that Chacoan roads in the Lobo Mesa area did not follow least cost paths (but see cautions in Field et al. 2019). Further evidence against trade on Chacoan roads comes from the nature of the ceramics found along them; non-local wares are rarer on roads than would be expected for trade corridors, accounting for 20 to 27 percent of sherds along the North and Ah-Shi-Sle-Pah roads and only 7 percent on the South Road (Kincaid et al 1983:Figure 9-30).

Notions of an integrated transportation system were further stressed by the fragmentary nature of the vast majority of Chacoan roads. Roney's (1992) synthesis of the BLM roads study found that most roads "are short segments that begin at a Chacoan outlier and have no obvious endpoint…[and] often do not clearly link the Bonito-style buildings to one another" (Roney 1992:125, brackets inserted). He suggests that the short lengths of Chacoan roads reveal that they operated at the local rather than regional scale and that the shared experience of constructing these short, spoke-like segments facilitated social integration and group identity reinforcement for Great House communities. Cameron and Lekson (2018), however, raise important cautions with regards to the notion that all roads were short segments. They suggest that alignments of Great House sites may mark the remaining representation of previous roadways that have vanished over the last millennium. Certainly, the question of road length is key to understanding their role within the Chaco regional system and deserves further attention.

Numerous Chacoan roads link Great Houses to dramatic landscape features, suggesting that one of their purposes was to establish physical and conceptual links with revered elements of the natural world (Marshall 1997; Sofaer et al. 1989; Till 2017). "Time bridge" roads that connect non-contemporaneous sites also clearly play a symbolic role, rather than an economically utilitarian one (Fowler and Stein 1992). These symbolically charged destinations lead many researchers to interpret Chacoan roads as spiritual features that materialized cosmological concepts and connected Great Houses with sacred sites (Friedman et al. 2017; Kantner 1997; Marshall 1997; Sofaer et al. 1989; Stein et al. 2007).

The uniformity of road construction and associated architectural features suggests a unified concept across the Chaco world, even if roads did not connect sites throughout the region in a single network. Lekson (1991:48) argued that, "roads are the least ambiguous archaeological evidence of a regional system we have ever found in the Anasazi Southwest," a position he still maintains in interpreting Chaco as a low-density urban state in which roads channeled tribute and redistributed bulk and prestige goods throughout an integrated polity (Lekson 2018). Vivian (1997:50-51), on the other hand, proposes that roads were constructed to engender a sense of unity among fragmenting Chacoan populations in the latter half of the eleventh and early twelfth century.

I now turn to presenting four apophatic theses on Chaco roads, with examples drawn from my ongoing Ph.D. dissertation research at the University of Colorado Boulder. Before initiating these cogitations, I must acknowledge the incalculable guidance and support offered by my two main collaborators—John Stein and Rich Friedman—whose Jedi-like skills in coaxing the subtle traces of Chacoan roads from remotely sensed imagery and vast desert landscapes are staggering, and which I can only hope, after many years of training, to one day approximate.

Thesis One: Not All Chacoan Roads are the Same

Most scholarship discusses Chacoan roads as a single feature class, with "time bridge" roads occasionally separated as a distinct type (e.g., Kantner and Kintigh 2006:161-165). Previous syntheses and my in-field observations, however, reveal a multiplicity of road destination types, suggesting diverse purposes, associations, and uses across Chaco's 400-year history (see Thesis Two for a discussion of whether "Chaco" had a 400-year history). A dichotomy between "politics/

economics" and "religion," in which roads are *either* symbolic corridors *or* a transportation network, has further hindered understandings of Chacoan roads. Thus, there is need for greater nuance in identifying different road types that also acknowledges the lack of compartmentalization between "material" and "religious" spheres in Chacoan, and most ancient, societies (e.g., Fowles 2013). For example, Pauketat (2013:78) suggests "the movement of people, timbers, pots, foods, and ritual packs along these pathways was, besides a religious-economic circulatory system, an experiential cosmography that engendered senses of history, heritage, and time."

Destinations and degree of formalization vary widely across Chacoan roads, and it is a mistake to continue grouping all roads together as a single feature class. At the time of this writing, I have observed the following: roads that address or physically connect with landforms; astronomically-aligned roads (both of the former can be grouped as "formalized alignments" following Stein et al. 2007); "time bridge" roads (Fowler and Stein 1992); roads connecting contemporary sites; roads connecting ritual architecture within a single site; formalized avenues that prescribe movement into or within a Great House landscape; non-constructed "roads" (perhaps better described as "alignments") consisting only of linear ceramic scatters; belt-loop roads (Hurst and Till 2009); and circular "roads."

Let us consider an example. Roads at the Kin Nizhoni outlier—consisting of two Great Houses and an associated community dating to late Pueblo II and early Pueblo III periods (Marshall et al. 1979:169-186)—are excellent examples of what Stein and colleagues (2007) call "formalized alignments," linear earthwork features that address various terrestrial, celestial, and other esoteric phenomena. The site also includes a "time bridge" road and a road connecting contemporary Great Houses, highlighting the diversity of road destinations at a single site.

At least six massive pre-Columbian roads are present at Upper Kin Nizhoni; one to the east (A), one to the southeast (B), one to the south-southwest (C), one to the southwest, which measures 17-m wide (!) (D), one to the west (E), and one that ascends the mesa top behind the site (F) (Figure 1). How can this multiplicity of road-like earthwork spokes be approached? Remote sensing will not help us here; an on-the-ground perspective is required (see Thesis Three below). From the perspective of the Upper Kin Nizhoni Great House, it becomes clear that many of these roads are addressing prominent landforms on the horizon: Road C defines a clear alignment towards Gallo Peak in El Malpais National Monument; Road D aligns with a jagged section of the Zuni Mountains (including Mt. Sedgwick, the highest peak in the Zuni Mountains) peeking through a break in the nearby mesa edge; and Road E points towards the prominent trapezoid of Round Butte (Figure 1). Road B connects the Upper and Lower Kin Nizhoni Great Houses along an alignment towards Tsoodził (Mount Taylor), which dominates the southeastern horizon. Not all the road alignments at Upper Kin Nizhoni are short "spokes" that point to landforms, however. Instead, Road A, set on a course of 102 degrees, extends towards the San Mateo outlier Great Houses and is photo visible for a distance of 3.9 km (2.4 mi). Road F has no clear connection or destination referent but continues across the mesa top for 800 m (0.5 mi).

Some basic patterns emerge from Kin Nizhoni. For one, roads that address landforms seem to be constructed only to the length necessary to clearly express alignment towards a particular landmark or in a particular direction from the perspective of the Great House. The apparent terminus of one of these, Road D, is a small two to three room structure lacking any substantial midden deposit. On the other hand, roads that served a different purpose than formalizing directional relationships with striking natural features (landforms that were almost certainly considered animated in Chacoan society; see Thesis Four) continue for greater lengths, suiting their uses. Road A, for example,

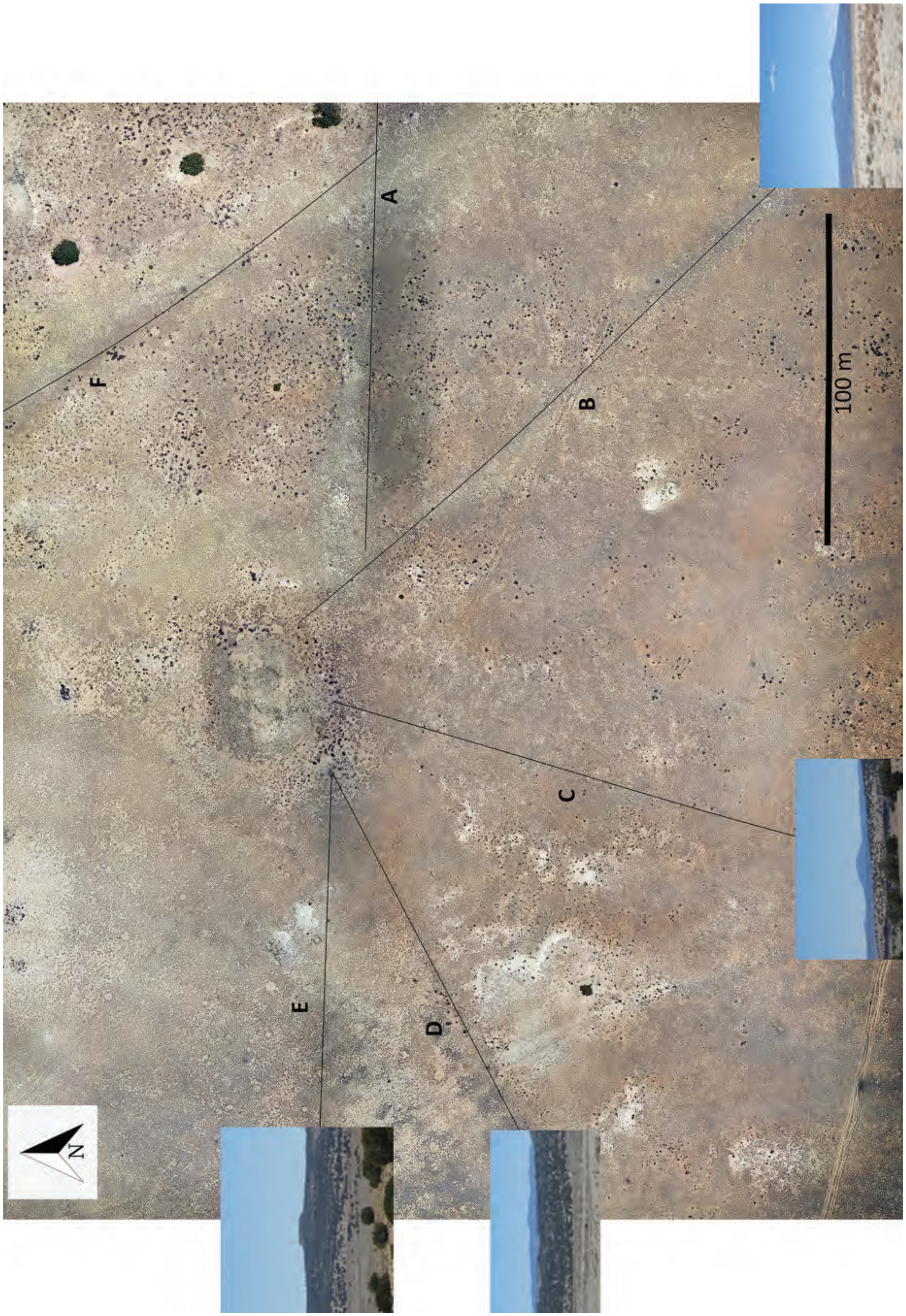

Figure 1. Drone orthophoto of the Kin Nizhoni Great House landscape, with road segments labeled and the landscape features they address shown. Orthophoto courtesy of Richard Friedman; landscape photos by Robert Weiner.

likely continued all the way to the San Mateo Great House, physically connecting Great House structures, and Road B forms a literal link between the Upper and Lower Kin Nizhoni Great Houses. The "technology" of roads, it would appear, was about physically manifesting connections, but the nature(s) of the entities being linked and the reasons for seeking connection certainly varied. For example, connecting Upper Kin Nizhoni (a later Great House) and Lower Kin Nizhoni (an earlier Great House in the same community) perhaps related to ancestral power and ritual legitimacy; connecting Kin Nizhoni to the San Mateo Great House (a nearby Great House and associated community) perhaps showed regional social connections; and connecting Kin Nizhoni to distant Gallo Peak might have linked the Great House to a repository of spiritual power and blessings (see Thesis Four below).

A variety of other road forms are present throughout the greater Chaco World. In southeastern Utah, roads approach—and then skirt—Great Houses (Hurst and Till 2009). Elsewhere, such as the Holmes Group in the La Plata Valley and the Brewer Mesa Great House in southwestern Colorado, linear roads intersect circular roads that encompass Great House architecture (Figure 2). Although parsing these differences and considering

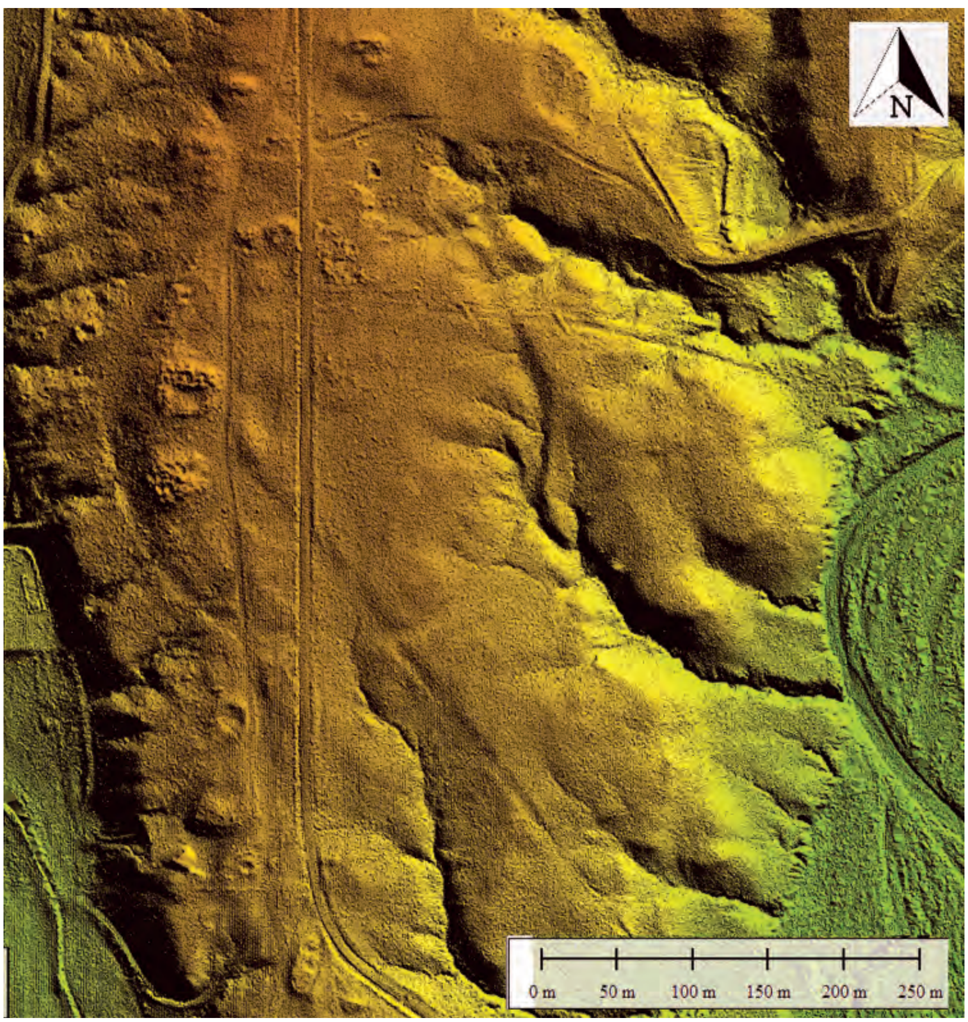

Figure 2. LiDAR image of the Holmes Group showing circular road surrounding two Great Houses cut by a linear road. Courtesy of Richard Friedman.

their implications are far beyond the scope of this brief review, I hope to have made a case for recognizing the diversity among Chacoan linear and non-linear earthwork alignments and the necessity of studying "subtypes" rather than a monolithic concept of "roads."

Thesis Two: Not All Roads are "Chacoan"—Or the Concept of "Chacoan" must be Reassessed

I will not dwell long on this thesis; it is far too broad in scope to be addressed here and much of the argument has been made before with great erudition by Fowler and Stein (1992). Nevertheless, the questions of "In what sense are roads 'Chacoan'?" and "What is meant by this ominous qualifier?" must be addressed and rests upon dating roads Two examples drawn from my dissertation fieldwork, as well as previous scholarship, flesh out these inquiries.

West of Chaco Canyon, roads are present at numerous Basketmaker III sites in the Chuska Valley. Near Two Gray Hills at two villages devoid of post-Basketmaker ceramics, wide roadways approach and articulate with pit structures (Weiner and Friedman 2019). South of Two Gray Hills near Tohatchi, a wide, formalized avenue ascends a mesa top where a Basketmaker III village with a Great Kiva is present (Weiner and Friedman 2019). And south of Chaco Canyon, a road ascends a constructed earthen platform adorned with *herradurras*; the platform is associated with Basketmaker III sherds and its nearest settlement is a Basketmaker III village (Nials et al. 1987:38-39; 178-179; Weiner and Friedman 2019).

Let us turn now east, rather than west, of Chaco, and after, rather than before, the so-called Chaco Florescence. Twenty km (12.4 mi) east of Chaco Canyon on the sprawling piñon-juniper covered Chacra Mesa lies Reservoir Ruin, a massive Great House with a ceramic assemblage defining a clear Pueblo III association. Shooting southeast from the Great House is a characteristic Chacoan road, 9-11 m (30-36 ft) wide and uncompromisingly straight in its trajectory (Figure 3**)**. The road traverses the mesa top and forks at the cliff edge; one segment backtracks and ends at a small mound of burnt jacal with Pueblo III ceramics (an anomaly in itself), and the other descends to an alcove below the cliff containing a Pueblo III cliff dwelling and rock art panel. There are very few ceramics predating Chaco-McElmo Black-on-white associated with any of these features.

Many other roads dating to the post-Chaco period are known and have been presented in the published literature. Most notable are the time bridge roads that connect post-Chacoan monumental ritual architecture with earlier Chaco-era Great Houses (Fowler and Stein 1992). Other time bridge roads, however, such as forks of the South Road that connect with Basketmaker III and Pueblo I Great Kivas at Kin Ya'a and Casa Patricio respectively, demonstrate that the practice of constructing monumental roads to connect with ritual architecture from previous eras was not a novel innovation of the Pueblo III period.

In short, monumental roadways both pre- and post-date the construction of multistoried masonry Great House architecture in Chaco Canyon. Should we then abandon "Chacoan" as a qualifier for these features? Or might these examples, which are but a handful of many, lend credence to the notion that the construction of Great Houses—often understood as a watershed development defining a distinctive Chaco "era" or "phenomenon"—was one manifestation of a continuous cultural-religious tradition spanning centuries across the U.S. Southwest?

Fowler and Stein (1992) have suggested that the regional organization often considered unique to the Chaco era was, rather, in place from Basketmaker III times through the late Pueblo III period when the Four Corners region was abandoned *en masse*. They trace the development of iconic

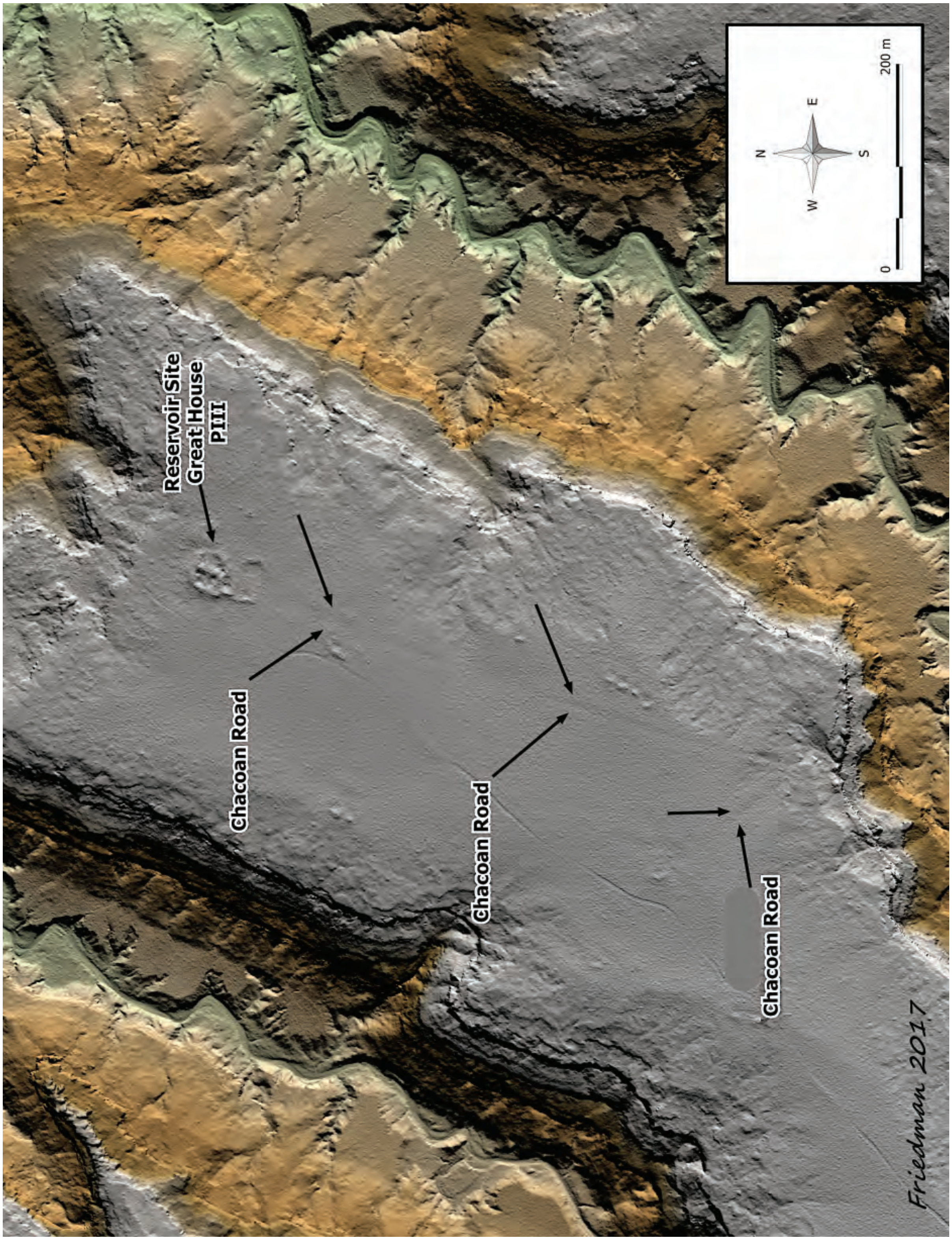

Figure 3. LiDAR image of the Reservoir Great House landscape, with road segments marked. Courtesy of Richard Friedman.

ritual architectural styles across these periods, beginning with Basketmaker III Great Kivas through Chaco-style Great Houses and ending with sprawling Big House complexes that encapsulate the suite of ritual architectural features associated with Anasazi ritual landscapes in a single structure. Critically, they present evidence from Manuelito Canyon to suggest that the layout of Kin Ho'choi, a Chaco-era center, was determined in the preceding early Pueblo II (Red Mesa) era—including road alignments (Fowler and Stein 1992:108).

My point here is to emphasize that evidence of Basketmaker III roads further supports Fowler and Stein's notion that a characteristic suite of ritual architectural features was established from early periods and modified throughout a period of centuries. Specifically, our initial investigations of monumental road features in the Chuska Valley, as well as the preponderance of post-Chaco period roads, suggest that roads may have been among the longest-lived elements of this "Chaco vocabulary" list. Furthermore, I suspect that many more Basketmaker III and Pueblo I roads await discovery, having evaded detection given the widely internalized notion that monumental roads are "Chacoan" features.

Thesis Three: Remote Sensing is Crucial, But Not Enough

Remote sensing technologies have long played a central role in Chacoan roads research (e.g., Friedman et al. 2017; Lyons and Hitchcock 1977; Obenauf 1991). Most roads have not been easily visible from the ground in the last century, so naturally aerial perspectives have played a key role in finding Chacoan roads. A tension exists between efforts that stop with the identification of linear surface anomalies from the air and those that emphasize the necessity of follow-up ground truthing to solidify their existence. For example, the largescale BLM roads projects were intended, first and foremost, to prove that road-like features in aerial photographs were indeed "real" archaeological features visible on the ground (Kincaid 1983; Nials et al. 1987; Roney 1992).

The question of "invisible" roads quickly strays into the territory of philosophy. How are we to deal with roads that produce clear "Chaco-road-looking" signatures from the air but are devoid of evidence on the ground in the form of ceramic scatters, vegetation patterns, caliche-up rock concentrations, *herraduras*, and so forth? Or, what about a recently recognized section of the North Road measured with LiDAR at 9 cm (3 in.) in relief across the road's 9-m (30-ft) width, something impossible to see with the human eye on the ground (Friedman et al. 2017:Figure 7)? This segment was "not" a road, but now it "is," given new technological possibilities, even though it has no surface signature. This example offers evidence in support of the notion that many Chacoan roads *will have no surface expression* (cf. Cameron and Lekson 2018), which is not to deny the reality of false (i.e., historic or natural) linear alignments with remotely-sensed signatures closely resembling prehistoric avenues.

I will ponder such matters no further, but raise them here as initial inquiries in a dialogue well worth pursuing. Instead, my main intention in this section is to emphasize that, while remote sensing technologies will always remain indispensable for Chacoan roads research, their fundamental weakness—even more so than "false positive" identifications of roads—is a lack of interpretive power. A strict reliance on remotely sensed data offers no insight into road-related practices and has led to overly broad generalizations divorced from the specific details of road use and form on the ground level. For example, a ground-level investigation of the course of the North Road—and, specifically, the narrow wooden stairway by which it ascends/descends Kutz Canyon (Marshall and Sofaer 1988:119-130)—seriously challenges recent GIS-based interpretations of timber transport along its corridor (Field et al. 2019). The BLM projects were aimed both at proving the existence of Chacoan roads (Kincaid 1983) and investigating which photo-interpreted segments could be identified beyond a doubt on the ground (Nials et al. 1987). These efforts were not, however, concerned with asking how roads were used and what they meant. I do not mean this as a critique; the BLM efforts were pioneering and staggering in their precision and breadth, and the data collected from their project form the very pieces with which to stitch together potential interpretations of Chacoan roads. New analytical tools and theoretical perspectives make such first steps possible, and it is with these that the remainder of this paper is concerned.

Microscale analyses of individual roads and their associated architectural features and artifact assemblages are necessary to approach larger questions about the use and meaning of Chacoan roads. Specific practices and local histories of practice *create* larger social processes (Pauketat 2001), highlighting the importance of what people did on Chaco roads, and why, for understanding larger questions of regional organization and inequality. In the literature, there are scattered references to processions (Roney 1992:130; Van Dyke 2007:57, 166; Weiner 2015:236-237); closure (Fowler and Stein 1992); transport (Field et al. 2019); ceremonial breakage of ceramics (Sofaer et al. 1989:371); sweeping/cleaning (Nials 1983:6.45; Windes 1991:123); races (Roney 1992:130; Toll 2001:69); and rituals related to fire (Sofaer et al. 1989:372). But there has been no systematic or empirical assessment of these proposals. For my dissertation, I am assessing the evidence for each of these possible uses through documentation of roadways and their associated artifact assemblages and architecture.

Consider an example: ceramic scatters. The BLM investigations repeatedly encountered long, linear scatters of ceramic artifacts in direct association with Chacoan roads. These road ceramics lack use-wear that would suggest use as digging tools and frequently occur far from the location of communities (Marshall and Sofaer 1988:149; Nials et al. 1987:25). Most pottery sherds found along roads average 2.5 cm in maximum linear dimension, and obvious pot drops are exceedingly rare. Some see these assemblages as intentionally broken pieces scattered as offerings (Copeland 2014; Friedman et al. 2017), others see them as refuse deposited as way-markers (Cameron and Lekson 2018) or simply as dropped pots (Windes 1991).

My team has documented the locations, types, forms, and spatial relationships of ceramics on a particularly sherd-dense segment of the North Road south of Pierre's Complex (Figure 4): 613 sherds within two 250-m-long (820-ft) segments between deep swales. Among the questions I ask of this data are: was domestic trash transported and scattered along roads? If not, are certain vessel types over/underrepresented in comparison to Great Houses earthworks or domestic middens? How do road ceramic assemblages compare with the data Toll (2001) interprets as evidence for largescale intentional breakage of ceramics at the Pueblo Alto mound? Why, curiously, are dense ceramic scatters limited to specific segments of the North Road? And, ultimately, why were so many fragmented pots deposited on a monumental avenue traveling due north from Chaco Canyon?

Preliminary chi-squared analysis (Figure 5) of BLM road data reveals patterning in the ceramic assemblages associated with different contexts along Chacoan roads, confirming the potential for more in-depth investigation of these depositional practices. Chi-squared tests determine whether there are statistically significant relationships between variables using contingency tables. Contingency tables compare expected values within a cell based on row and column totals within a dataset. Cells that are much larger or smaller than the expected value represent association between the two variables in question. In this example, I identified greater-than-expected quantities of decorated and

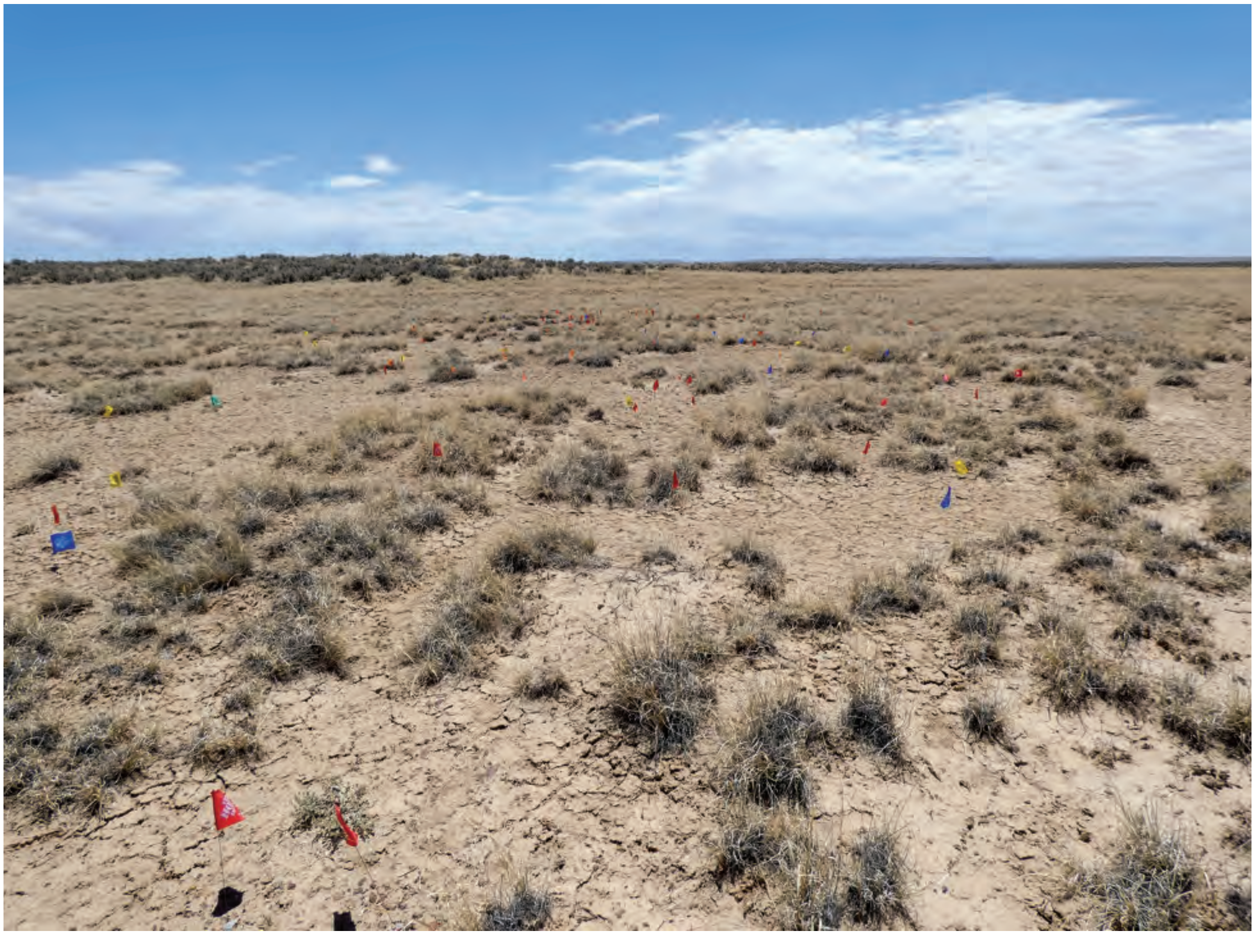

Figure 4. Pin flags marking hundreds of sherds along a section of the North Road. Photo by Robert Weiner.

intrusive wares at shrines and stair assemblages, and an inverse pattern (i.e., greater-than-expected quantities of utility and local wares) in Great House assemblages. This may suggest that offerings of purposefully destroyed high-value ceramics were more commonly made at shrines and stairs than Great Houses, where ceramics associated with food preparation are more common.

This brief inquiry into shattered sherds along Chacoan roads is but the tip of the iceberg. There is a wealth of evidence for ritual practices in road-related architecture such as enigmatic "road rooms," gates, and single-coursed masonry walls that "close" roads. The fine-grained studies needed to parse their archaeological signatures are, however, time-consuming and frustrating in their subtlety. Such investigations are critical, though, if we are ever to approach a fuller vision of the use and meaning of Chacoan linear earthworks beyond their road-like signatures as glimpsed from above.

Thesis Four: Roads Cannot be Understood Without Reference to an Animated Cosmos

Finally, I wish to emphasize that the use of the four-letter word "road" to describe linear Chacoan earthworks has long hindered interpretations and led to a (perhaps unconscious and automatic) spurious correlation of form with function. Chacoan linear earthworks "look" like roads that, in many places throughout time, are functional infrastructure created to facilitate transportation of goods and

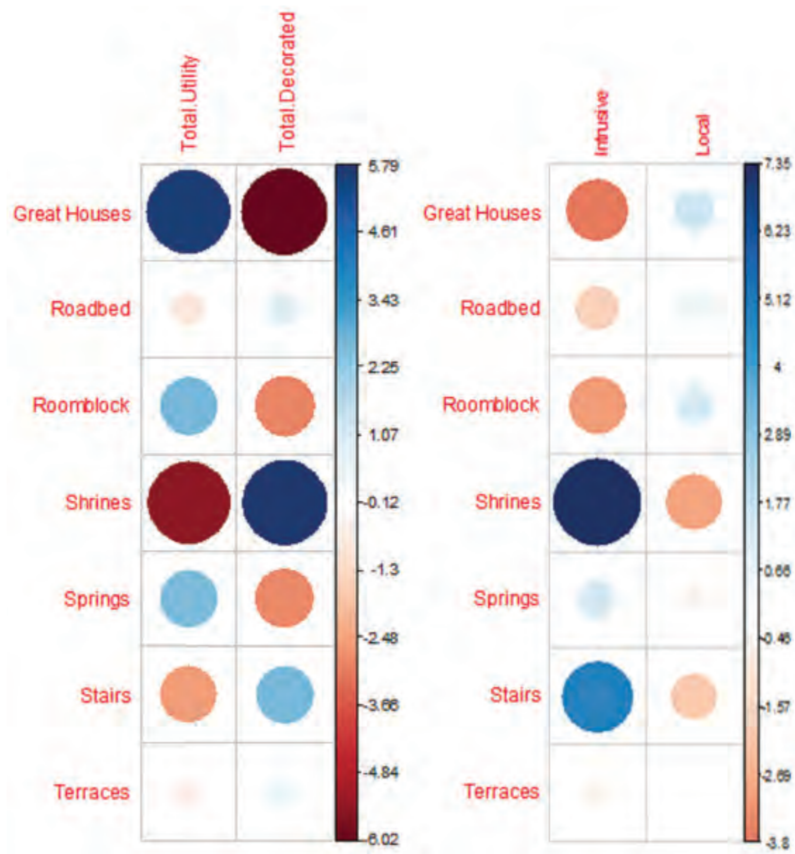

Figure 5. Visual representation of chi-squared analyses of ceramic types found at different features along Chacoan roads (data from Kincaid [1983] and Windes [1991]). Blue represents a positive association, red/orange marks a negative association, and the size of circles represents the strength of the association. The numbers on the scale are chi-square score values.

efficient movement of people. But, as described above, many aspects of Chacoan roads do not fit this picture of economic utility.

There is a diversity of evidence that the destinations of Chacoan roads were more related to the forces governing the function of the cosmos than to economic concerns. Numerous Chacoan roads link Great Houses to dramatic landscape features: the North Road articulates with the badlands topography of Kutz Canyon, the South Road leads to towering Hosta Butte, and the Ah-shi-sle-pah Road terminates at the ephemeral pond of Black Lake (Marshall 1997; Sofaer et al. 1989). Road segments associated with Chaco outliers in southeastern Utah also connect with special topography (Till 2017). Chacoan roads relate not only with terrestrial entities, but also the sun and moon. Broad avenues at the outliers of Skunk Springs and Pueblo Pintado align with the winter solstice sunrise and summer solstice sunset, respectively, and lunar aligned roads are known from post-Chacoan sites in southwestern Colorado (Coffey 2016). Of course, "time bridge" roads that connect non-contemporaneous sites also clearly played symbolic rather than economically utilitarian roles (Fowler and Stein 1992).

Fortunately, recent theoretical orientations in archaeology offer useful perspectives for moving beyond a vague sense that roads were "ritual" features, toward a consideration of what specific aspects of their construction and use engendered interaction between Chacoans and the powers of the cosmos. Increasingly, some archaeologists locate a crucial aspect of *why people do what they do* (in the case of "Chaco", creating and participating in a regionally integrated system in which certain individuals and families received disproportionate benefits) in the interactions between people and a wide variety of entities considered animate within their emic cultural context (e.g., Descola 2013; Lewis-Williams and Pearce 2018; Pauketat 2013). In such worldviews, the sun or moon are not the lifeless objects of scientific study conceptualized by contemporary Western science, but rather deities, powerful beings that can be contacted through ritual practices to bring about the harmonious functioning of the cosmos.

Descendent Diné and Pueblo traditional knowledge presents a concept of "roads" differing greatly from the functional associations in Western cultures and provide frames of reference with which to think about Chacoan roads. Ed Ladd (2014:65) writes, "The Zuni believe that everyone carries within himself his own personal 'life road' (/*onnane*)." Pueblo ceremonialists travel to sacred landforms along constructed pilgrimage pathways (Marshall 1997); some well-known examples include the Zuni Salt Lake Road and "rain roads" emanating from a shrine on Tsikumu, the Tewa West mountain, towards various villages (Douglass 1917). Spirit beings also travel along "roads." Parsons (1996 [1939]:17-18) explains that, "All spirits or sacrosanct persons have a road of cornmeal or pollen sprinkled for them where their presence is requested," and Zia tradition describes how "the road to Shipapo (entrance to the lower world) is crowded with spirits of peoples returning to the lower world, and spirits of unborn infants coming from the lower world" (Stevenson 1894:68).

Diné traditional knowledge describes roads that facilitate divine movement or are associated with spiritual protection. Diné people have shared that "the [Chacoan] roads were trenches or tunnels which allowed the Anasazi and/or early Navajo to conceal themselves from giants (*Ye'iitsoh*) as they travelled in the San Juan Basin" (Nials et al. 1987:28). One version of the origin story tells that at a time long ago in the region just north of Chaco Canyon, the Hero Twins "noticed a glint of rainbow laying [sic] like a rope on the earth. They walked on it. And as they walked, they started flying faster than eagles. They were walking on *atiin diyinii*, The Holy Trail, created by the Holy People!" (Kristofic 2015). Additionally, many sandpaintings "represent the road of life, or the trail of safety", and those being healed approach sandpaintings via a specially defined path of pollen footprints (Griffin-Pierce 1991:191-192). These perspectives highlight that within other worldviews, roads may mark alignments, destinations, and purposes that challenge conventional archaeological approaches to economic, or even "symbolic," corridors.

Despite an orientation in some circles of Southwestern archaeology, past and present, that disavows such notions as monumental linear earthworks built to align with and channel the potency of the solstice sun (e.g., Wills 2012:490-491), early roads researchers were nevertheless struck by the overwhelming evidence that the features encountered on the ground were better understood with reference to ritual than economics. Reassessment of many of the roads catalogued in Roney's (1992) synthesis as having "unknown" destinations will benefit from serious consideration of perspectives such as the Indigenous Southwestern concepts described above, and from framing interpretations within the possibilities revealed by extramodern worldviews.

Conclusion

To conclude this brief exercise, I will emphasize the urgency of conducting fieldwork to document Chacoan roads. Day by day, the forces of nature are demolishing their remaining traces with stunning efficiency. Many roads clearly visible on the ground during the 1980s BLM studies can now only be seen in remotely sensed imagery (Friedman et al. 2017). The advent of livestock grazing and other highly impactful human practices have accelerated the transformation of the ground surface such that the topographical expressions of countless Chacoan roads have likely already disappeared completely. While roads may still exist as sherd scatters or linear alignments of small enigmatic architectural features, soon we may not know where to look for such alignments in the first place.

We have a duty to learn from Chacoan roads while we can still see them; they are, to quote Lekson (2018:212; caps in original), "an amazing gift from the archaeology gods, but WE DO NOT HAVE A MAP." I have attempted to outline some foundational statements from which to begin this investigation, one that is massive in geographic scope and time depth, but requiring myopic attention to the subtlest single-course rock alignment or slight difference in vegetative ground cover. With its "roads" crossing hundreds of miles of the Colorado Plateau mapped, known, and examined within an animated worldview, Chaco (meaning, the regional society of the Four Corners from A.D. 500-1300) assumes its place among the great early cultures of the globe.

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