CLIMBING THE ROCKS

Papers in Honor of Helen and Jay Crotty

Edited by:
Regge N. Wiseman,
Thomas C. O’Laughlin
and Cordelia T. Snow

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THE ARCHAEOLOGICAL SOCIETY OF NEW MEXICO: 29

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It's hot in the summer, cold in the winter, windy in the spring, and perfect in the fall. The walk into sites can be long and arduous, carrying all your equipment and personal stuff. After all, you don't want to have to climb that steep slope, dodge boulders, and slip up and down any more than you have to.

Then there is the patient searching for the figures, getting the correct light angles, checking back at different times of day, and even coming back at different seasons to check yet again.

You're all set now. You have your crews, your work assignments, and it's time to settle down and start the lengthy process of mapping, photographing, drawing, and recording each section of each panel of figures. Ah, yes, camera angles! It is so difficult to get further out or closer in when you need to. Then there are the ones that you have to "scootch" into the low overhang on your back and look up at the bottom of a huge rock. Get the grid right! Don't forget the scale! Sounds like army boot camp!

Whew, this rock art recording stuff would be even more fun if it weren't for the thousand and one (or is it two?) details required by that eternal striving for completeness and accuracy. Oh yes, and then there is that wonderful subject matter - the figures and mazes themselves!

It can all be so rewarding and fulfilling. And for rock art specialists like Helen and Jay, who have spent so much time in the field, recording prehistoric and historic phenomena so long mostly ignored by other archaeologists and historians. How many figures and panels and sites have they themselves recorded? How many people have they trained to carry on the endless work? These evidences of the past - be they artistic expression, or religious devotion, or the imparting of important knowledge about the resources and trails of the area - are at once everywhere, but yet are slowly disappearing through subtle and not so subtle means.

New Mexico owes a great debt of gratitude and heart-felt thanks for all the work the Crottys have put into recording and preserving knowledge about her recent and not so recent past. It is with great pleasure that the Archaeological Society of New Mexico dedicates this volume of papers in honor of Helen and Jay Crotty.
Our path to rock art recording was anything but direct. It grew out of separate and shared interests, casual encounters, and fortuitous events, but there is little in our early years to hint that climbing around on rocks to photograph and map prehistoric images would become a consuming passion in our middle age and well into Senior Citizen status. As we've been asked to provide some information about our early history, we'll start at the beginning, before rocks loomed so large in our lives. We were born in the same hospital (Children’s) in San Francisco; Jay on May 1, 1926, and Helen on August 13, 1928. Both of us grew up in Northern California, starting first grade at age five because the schools we attended were so small they didn’t offer kindergarten classes. We both learned to write left-handed, but we do most other things right-handed. Beyond those coincidences, we had quite different childhoods.

Jay’s parents divorced when he was very young, and he was sent to live with his maternal grandparents, Andrew (Gus) and Mary Kimerling, on their chicken farm on the outskirts of Santa Rosa. He got along well with his grandfather and followed the old man around the farm, helping with such chores as he could handle. His grandmother, who had come from Scotland to the Indian Territory of Oklahoma as a young girl, was a strict taskmaster—and perhaps not particularly pleased to be saddled with a very young grandchild when she was in her sixties. The family agrees that she was not patient with little boys. She had four surviving daughters, the youngest of which was Jay’s mother, Marian; twin sons had died of “Blackwater Fever” back in Oklahoma while they were still infants. Jay remembers that on occasion if he asked, “Why, Grandma?” she would respond with an unerring backhand wallop that started at her hip and smacked into the side of his face to send him sprawling, “That’s why.”

It was a lonely childhood on the farm, with only the neighbor’s daughter, who was eight years older than he, for a playmate. Jay saw her every day when he went to her parents’ farm to pick up the evening’s fresh milk for his grandparents. As he grew older, he helped the neighboring farmers with prune picking and other chores that children were happy to take on for pennies during the Great Depression. One of the neighbors taught him to drive a Model A truck so that he could move the truck along the orchard rows while the farmer picked up and loaded the stacked boxes of fruit. Jay learned to manage the clutch and gearshift although he could barely reach the pedals. His mother visited occasionally on weekends, catching the last Greyhound bus to Santa Rosa after work on Saturday—the six-day workweek still prevailed—and returning Sunday evening. Sometimes he stayed a few days with his mother and aunt in their apartment in San Francisco. When there, he would phone his paternal grandparents, Harry and Neva Crotty, to come and get him. There was more to do at their house than in the apartment, and sometimes he and his grandfather walked the seven blocks to Playland at the Beach to watch people playing the games there. They rarely had the money to play themselves.
Grandpa Crotty, who was foreman of the composing room of a San Francisco newspaper, had contacts with circus people that he had developed as a young man when he used to spend his vacations traveling with the circus. When a circus came to town, Grandpa Crotty would take Jay to the show and later they would have dinner with the performers. The equestrian family were special friends, and Jay usually got to ride on a circus horse. Occasionally the circus people came to dinner at the Crotty grandparents' home. Other highlights of that time were the week-long summer camping trips in the Sierra with his father, Jay Paul, and stepmother, Vida. Vida taught him to fish, Indian fashion, as she called it, by sneaking up on fishing spot quietly and without casting a shadow so as not to scare the trout away.

Jay's only connection with archaeology or anthropology in those days was a gift of some arrow points, apparently made of jade, that his aunt Edna brought him after one of her trips as a ship's nurse on a steamer that traveled to the Orient. By the 1930s, cruise passengers were rare; most of the passengers were either missionaries or anthropologists. She probably got the points from one of the anthropologists, but Jay had no inkling of their possible value. He made himself a bow—not very good, he says—and attached them to some shafts and shot them into the prune trees on the farm.

When he was around eight, Jay contracted rheumatic fever and spent several months as a patient at the Stanford Convalescent Hospital—this cost him the year's head start in school. Then, when he was nine, his grandfather Kimmerling was killed in a traffic accident, and he and his grandmother moved back to San Francisco to live with his mother and aunt. Life was pretty boring in a San Francisco apartment, but a family friend took him to the public library and got him a card. After that he devoured books, mostly Westerns and adventure stories by Zane Grey. He also bought his own copies of books about trout fishing that he read over and over again. He attended various schools in San Francisco as the family moved about, and finally in 1941 enrolled in Lick-Wilmerding, a private technical and college-prep three-year high school with a generous scholarship program. Jay's ambition at the time was to be a tool-and-die maker—he had especially enjoyed machine shop training in junior high school—but the training he got in mechanical drawing, advanced mathematics, chemistry, and physics at Lick-Wilmerding was to serve him well in the future when he attended a night-class engineering college and then in his later employment. He always had after-school and summer jobs, starting with a paper route, then moving on to more adult jobs in the early 1940s during the wartime labor shortage. He joined the Boy Scouts and went to a summer camp in Marin County several times. The Scouts had the option of providing their own food to keep costs down, and Jay remembers the stews they made from the contribution of one can each of whatever they had. His favorite recreational activities in those years were fishing and shooting. His father gave him a fly rod one year, and took him to the practice casting ponds in Golden Gate Park to learn to use it. The day they were there, a Japanese man was practicing at one of the ponds, and Jay's father asked him to show the boy how to cast. It turned out that the man was a world champion competition dry-fly caster, but he generously spent about 20 minutes showing Jay what to do. Any further instruction in the art of fly-casting came from his books. Jay's father also gave him a .22 rifle which he learned to shoot, and he acquired some old rifles that he fixed up, utilizing the lessons of the machine shop classes. One day when he was buying reloading supplies, he was befriended by a member of a San Francisco gun club who brought him to the club for weekly indoor range practice and outdoor shooting on weekends. After his mother's remarriage in 1940, Jay went to live with her and his new stepfather, Curt Samuelson. Curt was the son of Swedish immigrants who belonged to a Scandinavian club in San Francisco, and it was indirectly through that club that we were to meet.
In November of 1943, Jay joined the Marine Corps, expecting to be allowed to finish his senior year at Lick-Wilmerding before being called to active duty. But the Corps had other plans, and he was ordered to report to the Recruit Depot in San Diego that December. After boot camp, he was sent to machine gunner’s school for more advanced training and then overseas. He arrived in Guam in August 1944 as a replacement at about the time the island was declared secure. Nevertheless, he and his comrades in the 3rd Marine Division spent the next six months on mop-up operations and additional combat training. In February they embarked on the voyage to Iwo Jima. The 3rd Division was “floating reserve” and did not take part in the initial landing February 19. After a day of circling in Higgins Boats on D+1—during which Jay curled up in the bottom of the boat and went to sleep—they clambered back up the cargo nets to the troopship for the night and then back down the nets the next morning and into the heaving boats to circle again—Jay took another nap—until they finally landed in the late afternoon. Their company commander was killed on their first day ashore, and casualties were cruelly heavy every day. Jay never saw the famous flag raising; Mt. Suribachi was on the south end of the island while he and his comrades were focused on the enemy as they fought their way northward to take the all-important airfields. On March 3, Jay and his machine gun squad were attempting to set up their weapons on a rocky face overlooking the north end of the island when they were hit by enemy fire. Jay’s buddy and machine gun partner was killed, and he, his squad leader, and two others were wounded. Jay was hit in the left leg and fell, becoming wedged between some rocks in an exposed position. During a lull in the shooting, his sergeant, Marion Nowlin, dragged him into a shell hole that offered some shelter, bound the wound, and gave him a shot of morphine before going back to the battle. Minutes later, the rocks where Jay had been wedged were pulverized by a mortar shell. Jay was evacuated through snipe fire to the aid station, then transferred to the USS Doyan, an attack transport. There he received emergency surgery in the wardroom and was encased in a cast that reached from his armpits down both legs. His feet spread wide apart to allow the bullet-shattered femur to heal in alignment, he had to be tilted sideways to be carried through a door. He sailed to Saipan on the Doyan. From there he was flown by PB2Y3 in three stages, with overnight stops at Eniwetok and Johnson Island, to Aiea Naval Hospital in Oahu, Hawaii. He marked his 19th birthday in Hawaii before being flown to Oak Knoll Naval Hospital in Oakland, California. He remained at Oak Knoll until discharged in April 1946 with the medical advice that he should never lift anything weighing over 25 pounds. We started dating while Jay was at Oak Knoll.

Helen grew up in a more conventional nuclear family setting in Burlingame, where her family had moved when she was two. Her parents, Karl and Maggie Koefoed, had immigrated from Denmark in the early 1920s. Maggie was a dentist who gave up her practice when she became pregnant with Helen. She was devoted mother and wife, and she returned to dentistry only after Karl’s death, when she was in her 50s, and carried on her practice until she was 80. Karl owned a small custom truck body manufacturing business in San Francisco, utilizing techniques adapted from the woodworking and construction skills he had learned in his father’s shipyard in Denmark. Helen’s brother Bill was two years younger and all too frequently, she admits, the object of her teasing. While the shadow of the Great Depression was never far away, life was easier in Burlingame than it was for Jay in Santa Rosa. The primary school was only a short walk up the street. Every Halloween, the children and parents gathered scrap wood for a bonfire in the schoolyard, and the children paraded around the fire until the winning costumes were chosen. Then everyone went inside the school to the booths run by PTA members--fortune telling, bobbing for apples, throwing darts. Helen has always thought it was a lot more fun than Trick or Treat, which started about the
time she was growing too old for such things. Summers were dull; because of the threat of polio, she and Bill mostly stayed home in their own yard with few other playmates or activities. Later she joined the Girl Scouts with her classmates and enjoyed the meetings and field trips and several summers at the camp in the Sierra Nevada. Like Jay, she borrowed stacks of books from the public library and read a lot. She bought her own copies of the children’s classics with any cash presents. At the library, she especially liked books about Indians (probably mostly romanticized stories), and enjoyed the books by cowboy author and illustrator Will James. This was the extent of her childhood anthropological and archaeological interests. In 1937, when it was becoming clear that war in Europe was not far off, Maggie took the children for a visit to the relatives in Denmark. They traveled by steamer through the Panama Canal each way, a great and unforgettable adventure for Helen and Bill, but that’s another story.

Helen went to another elementary school farther from home for sixth through eighth grades and then to Burlingame High School, which she attended through the war years. One of her most lasting memories of that time was the summer that she and other students and teachers from the high school went to California’s Central Valley to help harvest the peach crop, living in the dormitories previously occupied by now-interned Japanese farm workers. Working as hard as she could at unfamiliar tasks like setting ladders and being expected to stand on the top step to pluck fruit from high branches, Helen found that she could barely earn the nominal room and board. Since then, farm workers have always had her sympathies. She graduated from high school in June of 1945, when almost all the boys in the class had either been drafted or had enlisted in various military college programs.

Karl and Maggie Koefoed belonged to a circle of Scandinavian immigrant friends that met frequently for parties in the various homes. They were also in touch with a distant cousin of Karl’s who knew the Samuelson family through another Scandinavian group. It was through that cousin that Jay and Helen first met, probably sometime in 1942. Jay phoned a few days later to invite Helen to the Ice Follies, but her parents wouldn’t permit her to go out in San Francisco with someone they didn’t know, and that was the end of their friendship for the time being. The family stayed in Burlingame until Helen graduated from high school; then they moved to Aptos, where they’d had a summer house since 1938. They had bought an apple, pear, and plum orchard—everyone called it a “ranch”—in the hills behind Aptos sometime during the war and planned to build their retirement dream house there. Helen had been accepted at Stanford and moved to a dorm on the campus in the fall of 1945. Shortly after that, Maggie heard via the Scandinavian grapevine that Jay had been wounded on Iwo, and she sent Helen a postcard urging her to be “nice to him” and giving his address. Helen wrote a letter, and a meeting was arranged. She drove to Oakland and met him at the hospital. Although we’ve forgotten most of the other details of the date, both of us can remember exactly what she wore that day. Later, after Jay was discharged, he went to stay with his grandmother Kimmerling in a house his aunt had bought in the Santa Cruz Mountains near the place where his mother and stepfather were living. He worked with his stepfather at construction jobs. On Friday nights, Jay would drive to Stanford to pick Helen up and take her to her family’s house in Aptos for the weekend. During the drives, we would talk about Helen’s studies, and Jay always seemed to find probing questions that would uncomfortably test her newly acquired and not-as-yet digested knowledge, but she didn’t hold it against him. Even before we became engaged, Jay had been welcomed into the family (Figure 1). He and Karl shared an interest in hunting and fishing, and they often went bowling together during the week while Helen was at school. On weekends, Jay and Karl sometimes played tennis, or we might go fishing with Bill, or horseback riding at the “ranch,”
or swimming at the beach. In the evenings, Jay was a polite—if quietly unwilling—fourth at bridge with Helen and her parents. All in all, it was a happy time even if Jay didn’t share the Koefoed passion for bridge. After completing Lower Division requirements with honors, Helen dropped out of Stanford to marry Jay on September 27, 1947.

Before our marriage, we had decided to move to San Diego, where Jay’s father and Vida were then living. Jay found work at a custom truck body shop, this one specializing in metalwork, with much more blacksmithing and welding than woodwork. At the time, Jay had no desire to go on to college, and he applied his GI benefits to apprenticeship training. The heavy work wasn’t well suited, however, to someone who had been told he should never lift anything heavier than 25 pounds, and the Veteran’s Administration finally noticed that. Jay found another job at an auto parts company, having had some experience in that kind of work before joining the Marines. After the Korean War began, Karl’s business, which had not been doing well, picked up, and he offered Jay a job in San Francisco.

Shortly after our return to Northern California, Helen became pregnant with son Steve, who was born in March of 1952. Around this time Jay took up a longtime interest in flying that was to lead to his interest in mapping and eventually to a career in the title insurance business. He joined the San Francisco Squadron of the Civil Air Patrol, which at that time flew out of Chrsissy Field in the Presidio, not far from our apartment. It was on a weekend search mission with a female pilot who, it turned out, had recently bought the plane with her husband and had taken flying lessons, but had learned little or nothing of navigation. Sometime into the flight she noticed that the fuel indicator was low and asked Jay where they were. He had no idea, either, but they soon spotted a small airfield and landed without incident. Jay went immediately to the airport tower shop and bought a book on aerial navigation that he studied carefully before the next search assignment. Aerial navigation at the time relied on bearings and distances, as did land surveying, and Jay’s newfound interest was to change his career and his avocation.

We bought our first house in San Rafael, in Marin County, around 1954, and there was less time for flying, especially after Jay started studying engineering at night school. Meanwhile the job in Karl’s business had not worked out well, and Jay applied for work with the Marin County Assessor’s office, where his knowledge of drafting

**Figure 1**
*Helen and Jay posing with Helen’s father, Karl Koefoed, in his new jeep at the “ranch”, early 1946. Photo by Maggie Koefoed.*
and mapping were useful qualifications for the engineering department. The skills honed at the Assessor's Office led to a job offer from Title Insurance and Trust, for whom he worked for the next 20 years and later, after retirement, did consulting work on difficult wetlands title issues. Jay's expertise with surveying and mapping were later to be his special contribution to the Rock Art Recording Field School.

Our daughter Heather was born in 1956, and we began taking family car-camping vacations two years later. On a camping trip to Burney Falls State Park in Northern California, we heard about Lava Beds National Monument, which was not very far away. We drove up and spent the day looking around, and among the sights we saw was some rock art, which piqued our curiosity. We returned the next year. The so-called Petroglyph Point site was open to the public, but the rangers would not say much at the time about the pictographs in the lava tube caves in other parts of the Monument. Jay looked at the map in the visitor center and then at the landscape from the fire lookout station and figured out how to get to the caves. Access roads lacked signing and were now overgrown with grasses and scrub, but entrance paths at the mouths of the caves that had been constructed by Civilian Conservation Corps crews in the 1930s remained visible. We took some snapshots of both petroglyphs and pictographs, and we were hooked, but we didn't know it yet. The pictures languished for another 17 years before they were hauled out for a research project, and we didn't notice any more rock art in the intervening years, when we spent our vacations backpacking with the children among the granite slicks of the Sierra, Jay having decided that if he took off some body weight, he could carry more than 25 pounds in a pack. The goal of the hikes in those days was good trout fishing, and Jay would study USGS quad sheets to plot cross-county routes to campsites or day trips to “collect” any lake shown on the maps. Both children and eventually our three eldest grandchildren have become avid fly fishermen, but Helen never became very adept at casting.

In 1974, Jay was offered a job he couldn't refuse in the title research department of Title Insurance and Trust's home office in Los Angeles, and we left Marin County for southern California, determined that we might as well like it. The children were grown by then, legally of age, and neither of them was willing to move south with us. Helen had always wanted to finish her college education and had taken some courses from time to time at the College of Marin and San Francisco State College. She had also pursued an interest in art, working with an art appreciation program in the schools and as a docent at the California Palace of the Legion of Honor in San Francisco. Now that the nest was empty, she enrolled as an undergraduate in Art History at UCLA. After receiving her B.A. in 1976, she enrolled in the graduate program. At that time, the UCLA Art History faculty required graduate students to study an unrelated minor in addition to their major field and its related minor. So Helen decided to pursue her old interest in Native Americans, along with her major in Modern Art. The field of Modern Art encompassed European and American art of the nineteenth and twentieth centuries, and Helen chose to focus on French art of the nineteenth century, which had been well represented in the Legion of Honor collections. To meet requirements of the unrelated minor, she had to write a research paper on a Native American art subject, and she decided to dig out the old photos from Lava Beds National Monument and—such was the state of her ignorance at the time—see if she could figure out what they meant. Although she quickly learned that she would probably never decipher the meaning of the images, she noticed that rock art in the area known to have been occupied by the Modoc people differed in several respects from the Great Basin Style (as it was then called) with which it had been lumped. The paper pleased her professor, Cecelia Klein, who suggested that Helen join the American Rock Art Research Association (ARARA). In an ARARA
publication, Helen read about the annual ARARA conference in May and also saw a notice of the ASNM Rock Art Field School (RAFS) to be held in Chaco Canyon in June of 1977. Helen attended the conference, and we both signed up for the Field School.

When we arrived at Chaco, we told Jim Bain, the founder and Director of the RAFS about our previous hiking and backpacking experience and offered to record sites that were a long walk from the road. We were assigned to a team with Ray Poore, a nuclear physicist from Los Alamos, who instructed us in the techniques of recording. Col. Bain knew from the survey records that there were rock art panels on Fajada Butte and had been looking for someone to record them. He suggested, but did not insist, that we might like to take a look. When we got to the bottom of the chimney route to the top of the Butte, Ray and Helen decided it wasn’t for them, but Jay was game to go. At that evening’s “Happy Hour” gathering of the RAFS participants, he asked for someone to climb Fajada with him, and the only person in camp who volunteered to do so was Anna Sofaer. She was willing to go if Jay would provide a rope for her to hang on to. He had some rope in the camping supplies, and they set off the next day. Helen accompanied them to the bottom of the chimney and watched them climb up. Atop the Butte, Anna and Jay recorded the rock art panels nearest the trail. The next day, Helen again watching the ascent, was horrified when a large chunk of sandstone broke loose from one of the existing handholds as Jay pulled himself up. It brushed along his thigh as he instinctively jerked his body backward, then it crashed to the ground below with no harm done. Around noon on that same day, Jay and Anna happened to be standing near the rocks that create the light phenomenon Anna was to name the Sun Dagger. As we were told some years later, Anna had been fascinated by the book Stonehenge Decoded (Hawkins and White 1965), had subsequently studied reports of Native American astronomical observations, and had come to the Field School with a vague hope of finding a prehistoric calendrical marker. The discovery of the Sun Dagger was a serendipitous coincidence of the right person standing in the right place on a day near the summer solstice during the 18 minutes or so that the phenomenon lasted. Over the next winter Anna contacted archaeoastronomers, photographers, and other experts in related fields and made arrangements to fully document the Sun Dagger the following year. Helen and Jay met her at Chaco Canyon a week ahead of the RAFS session and helped to bring supplies up to the photographer, Karl Kernberger. That year Jay had another exciting ascent when he encountered the resident rattlesnake in the chimney. He quickly flipped it away with the crooked handle of the umbrella he carried to shade rock art panels and continued his climb. Anna had recruited a rock climber to install a proper mountaineering rope, and Helen was able to overcome her fear of heights and ascend the chimney on the day of the summer solstice to assist in photographing the Sun Dagger effect from an exterior angle. Jay later declined Anna’s offer to be a co-author of the report, and the publications that ensued never mentioned the ASNM Field School—or Jay—for the opportunity that made Anna’s discovery possible (Frazier 1979; Sofaer et al. 1979). However, Anna has always contacted us if she was give a lecture in New Mexico and credited Jay when he was in the audience.

The following seasons with the RAFS offered less dramatic adventures, but Helen and Jay continued to enjoy the one-week sessions and usually spent the second week of their vacation touring archaeological sites in the Southwest before heading back to their condominium in Palos Verdes. Meanwhile, back at the Art History Department at UCLA, Helen was invited by Cecelia Klein to participate in a seminar on the “Mexican Connection.” Dr. Klein, a specialist in Pre Columbian Art, had been asked to consult on a television program relating the prehistoric mural art of the Southwest to that of Mesoamerica. She organized the seminar to explore the evidence for
Mexican influence on the arts of the prehistoric Southwest. Each student was asked to research one of the various areas of art and architecture where similarities had been noted by Kelley (1966) and DiPeso (1968, 1974), among others. She asked Helen to investigate the Anasazi kiva murals. With her limited exposure to Southwestern archaeology at the time, Helen knew nothing about them, but found them intriguing immediately. Helen and the other students in the seminar were inclined at the start of their research to believe the assertions of Mesoamerican influence in their chosen subjects, and they searched diligently for the proof, but none of them could find evidence sufficiently strong to satisfy Cecelia Klein that the appealing arguments of the proponents of the “Mexican Connection” could stand up to rigorous examination. Cecelia Klein became a role model as well as mentor and official advisor in Helen’s later academic endeavors.

Another influential, if unofficial, mentor was Watson Smith, whom Helen first consulted regarding her kiva mural investigations in 1980. She treasures her thick file of correspondence with him about the murals of Awatovi and other Southwestern sites and later about the ceramics of the Rainbow Bridge Monument Valley Expedition, which she studied while an intern at UCLA’s Museum of Cultural History and which he had initially analyzed and published (Beals, Brainerd, and Smith 1945). The exposure to Southwestern imagery in kiva murals and ceramics contributed to Helen’s appreciation of rock art, and classes in archaeology at UCLA helped her to place the imagery in its cultural context.

The year 1980 proved to be pivotal for our future adventures in rock art recording as well as for Helen’s academic career. Prior to the RAFS session, Helen had attended an ARARA meeting in Albuquerque and had met with J. J. Brody to learn if the kiva murals might be available as a dissertation topic for her if she decided to change her major to Native American Arts, and she was pleased to learn that no one else was working on them. Jerry and Jean Brody were later to become Field School participants and eventually friends and neighbors. Helen had also arranged to meet with Watson Smith in Tucson after the Field School session, and after a pleasant and encouraging discussion with him, we continued our travels to some rock art sites in Arizona before returning to Palos Verdes. In Tuba City we stopped to buy an Indian pot as a present for Helen’s mother and chatted with the proprietor of the store for a bit, complaining about having to leave the Southwest to return to the smog and the crowded freeways of southern California. Her remark, “Why don’t you people get your priorities in order?” must have struck a chord, because from that time on we began to think about either a temporary or a permanent stay in New Mexico. Jay would be eligible in 1981 for early retirement after twenty years with Title Insurance and Trust, and our condominium had appreciated unbelievably in value in the Southern California real estate boom, which might help to finance such a move. We decided on a permanent relocation when Helen would have completed coursework for her Ph. D. After the RAFS session in 1982, we stayed with Jim and Nan Bain for a week, and Jim took us around to rock art sites as well as possible home locations around Albuquerque. Jay found a newspaper ad for acreage in the East Mountains and called the broker, who showed us a ten-acre parcel in the piñon-juniper woodlands that we knew at first sight was for us. We made an offer on it, returned to Los Angeles to put the condo on the market, and both deals closed on Helen’s birthday in August. We moved into the mobile home—dubbed by Jay the “Alcoa Hacienda”—on the property in September and four years later built the passive solar adobe “Mud Palace” that has been our home ever since. Now Helen could complete research for her dissertation in either Santa Fe or Albuquerque, and we were much closer to the rock art we wanted to help to record.

As Jim Bain’s eyesight began to fail, he depended more and more on Jay to help him in the field. After our move to New Mexico, Jay traveled with
him and Nan to scout out new locations for the RA FS, and both of us helped with other chores. In 1984, Jay invented some portable showers for Field School use, assembling tarps and rings of PVC tubing to be hung from trees for privacy while showering. Jim built duckboards to complete the amenities. This saved the participants a 22-mile round trip to Reserve to use the showers in the high school gym, and the field showers were used in all the succeeding field schools. In 1993, Jay devised tripods to hold the showers at the Taos Junction Campground where there were no trees.

The history and activities of the RA FS are detailed elsewhere (Crotty 2000).

Jay’s responsibilities for the RA FS grew after 1984, when Jim Bain appointed him Field Director. For the next few years Jay mapped search areas, directed crews to them, and generally supervised the fieldwork. In 1986, Mike Malouf, an archaeologist with the Las Cruces office of the Bureau of Land Management (BLM) approached Jim about possible RA FS documentation of sites on BLM lands in southern New Mexico. Jim, who had always been fond of Jornada Mogollon rock art, chose to locate the RA FS to the Three Rivers Petroglyph site despite our misgivings about the hot weather during the field season in late June. Jay spent the winter months working out a mapping system to divide the mile-and-a-quarter-long sub-triangular ridge filled with almost continuous petroglyphs into manageable sub-sites, or proveniences, that could be documented by individual crews during the field season (for details of the mapping, see Crotty 1992, Duran and Crotty 1999). The 1987 season was to be Jim Bain’s last. He was diagnosed with terminal lung cancer in September and almost immediately called upon Jay to take over the RA FS. He died unexpectedly soon in November, and we found ourselves in charge of all the planning and organization for the field work as well as the organizing of the crew reports that Jim had always taken care of.

Changes in RA FS forms and procedures had already begun with the 1987 season, and we insti-

tuted further changes as Jay reviewed the photographs and field reports from that year. After consulting with friends in ARARA who were doing rock art recording in other states, we incorporated sketches of the images on our photo-data sheets to better identify the rock art in the photos. Helen began to devise element, or image, categories that would standardize the inventories prepared by the crews so that the incidence of various elements and element types could be quantified. We also advised our BLM liaison, archaeologist Joe Martin, that funds should be budgeted to pay for a written report summarizing the findings of the RA FS at Three Rivers, something that had not been done in the past. Jim Bain had always made sure that the Archaeological Records Management Section at the Laboratory of Anthropology and the landowner or land managing agency received copies of photos, photo data sheets, maps, and the recording crews’ field reports, but these were only in the form of raw data. We were very pleased that Meliha Duran of Human Systems Research—and ASNM—was willing to take on this task and to oversee the data entry of the 21,383 elements the field school participants counted (Duran and Crotty 1999).

The RA FS spent six seasons, all told, at Three Rivers along with two extra spring sessions in 1990 and 1991 to survey and mark proveniences for the coming summer sessions and one in the fall of 1992 for a final mop-up (Figures 2, 3). Each summer the exposed film was turned over to the BLM to be processed. When the prints arrived, Jay would spend about three months, working alone for the most part, to organize the photos by provenience and photo data sheets, insert them into protective sleeves, and to check over the work of the crews, which often meant redrawing the sketch maps. Throughout the year Helen took care of any work that required typing, such as sending out articles soliciting volunteers, answering inquiries about participation, mailing acceptance letters, and preparing forms, address lists, and certificates for the participants. We would arrive a few days early for the field school and with
the help of one or two of the participants (Owen Severance, Will Mitchell, and Gene Riggs were especially faithful) set up camp and showers, place flags at datum points on the ridge, and generally get everything ready for the arrival of our crews. Together we tried to work out teams of compatible people and assign crew chiefs from among the returning participants. The crews were in the field early in the morning (by around 6:30) so as to complete the required four hours of field work before the day got really hot—and we went through some heat waves during the years at Three Rivers that sent thermometers well above the average high 90s for June. Afternoons were for paperwork, and evenings were for slide shows or lectures related to the rock art or archaeology of the region. Helen usually gave an introductory lecture and Jay gave a lecture and workshop on mapping. We invited guest speakers whenever possible, and we very much appreciated that Meli Duran or Dave Kirkpatrick would drive all the way from Las Cruces for each week's session to give a lecture on the archaeology of the Tularosa Basin.

We were ready for a cooler place to work and camp when we finished Three Rivers. We considered sites in the Galisteo Basin, but finding a suitable campground presented a problem. Then Paul Williams, ASNM trustee and archeologist with the Taos BLM office, suggested a site on 188 acres of private land near Lyden recently purchased by Katherine Wells; he also arranged for us to use the Taos Junction group campground in the Orilla Verde recreation area. A campsite with flush toilets, a telephone, and a swimming hole nearby was an unaccustomed and much appreciated luxury. Designating proveniences in the steep terrain of the Wells site was a new challenge for Jay, but with the help of Owen Severance and others, he worked out a system based on natural features such as ridges and drainages. Our new location attracted more participants than ever before, and we had waiting lists for all the sessions. But it was also more work for Jay to try to supervise seven teams each week, and we were still the first ones up and the last to bed during the sessions. Sometime during the spring of 1994 he told Helen that he was tired and didn't want to continue directing the RAFS after that year. Then, as he was conducting a mapping workshop that summer, he found himself unable to project his voice loudly enough for the audience. We knew something was wrong, but it wasn't until late in 1995 that he was diagnosed with Parkinson's disease in its early stages.
Although the RAFS occupied a lot of our time after 1977, we were involved in other activities also, many of them related to rock art and archaeology. Jay served as rock art advisor to the ASNM Board of Trustees and Helen was a Trustee from 1997-2001. Helen was vice president of the Albuquerque Archaeological Society in 1985 and 1999 and president in 2000. She also served as president of ARARA from 1986-1990, and she is most proud of her contributions in organizing symposiums on the subject of rock art conservation in 1987 (Crotty 1989) and on the problems of methodology in linguistic interpretations of rock art in 1988. The latter symposium took on Barry Fell and the Epigraphic Society, and Helen was able to find a scholar, Dr. Brendan O Hehir of the University of California, Berkeley, who was an expert on Old Irish and Ogam, to speak on the subject of Barry Fell’s interpretations of certain types of rock art as messages in Ogam (O Hehir 1988). For a variety of reasons, including Dr. O Hehir’s untimely death, the proceedings of the latter were regrettable never published. Helen blames herself for the delay and hopes one day to make O Hehir’s observations available in a publication. We visited many rock art sites all over the West in field trips associated with the ARARA meetings and Pecos Conferences and on our own, as well.

On the home front and off the rocks, Helen was involved with the formation of a neighborhood association to oppose proposed cyanide heap leach mining for gold in the mountains near our house. The association worked with other groups to get a hard-rock mining ordinance passed by the County of Santa Fe, and Helen served as the public member on the County Mining Plans Review Board. She also worked with other groups for passage of a State law to regulate hard-rock mining. She is still active in the association, which seeks to preserve the rural residential nature of the neighborhood against mining and subdivision development. In 1989 we both joined the local volunteer fire department, Jay as a firefighter and later an officer and Helen as a dispatcher, and we were instrumental in getting a substation built near our home. We’re still members, but our adventures with the department are another story. All this time Helen worked sporadically at researching and writing her dissertation. She also taught Native American Art History as a visiting lecturer twice at University of New Mexico and once each for Colorado College and a Colgate University Southwest Studies program. Finally in 1992, UCLA imposed a deadline for completion of the dissertation, and Jay told Helen she would never finish if she didn’t give up her vegetable garden and all the other things she was doing to work on it full time—except, of course, for RAFS and volunteer dispatching. This she did with Jay’s unwavering encouragement and support, starting in January 1993 and completing revisions in the spring of 1995. As might be expected, the dissertation has many references to rock art (Crotty 1995). We went to UCLA for Helen’s graduation that June (Figure 4), and our children joined us there for the big day.

Figure 4
Jay and Helen at Helen’s graduation, June 1995. Photo by Heather Crotty.
Although we had given up the summer field school, we continued with local rock art projects in the Galisteo Basin and Petroglyph National Monument, and we offered to travel to local ASNM affiliates statewide to give workshops on recording techniques, which we did for the San Juan and Dona Ana Societies. With Albuquerque Archaeological Society members and ASNM members from Santa Fe, we recorded the rock art at Pueblo Blanco in the Galisteo Basin and in 1997 began documentation of the nearby Creston site, better known as Comanche Gap, in cooperation with the New Mexico State Land Office and private landowners (Figures 5, 6). We had visited the Creston site many times when we first moved to New Mexico, and we especially wanted to record it. During the same years we have been part of the inventory crew headed by Jack and Anne Francis at Petroglyph National Monument. The National Park Service, at the urging of Milford Fletcher, has made available state-of-the-art global positioning system (GPS) equipment for the latter project together with sophisticated software for data entry of photos and all the other information gathered by the crews in the field. In preparation for the data entry, Helen worked over the element inventory categories again, this time with the aim of making the categories applicable to all New Mexico rock art sites, or at least flexible enough to accommodate site-specific elements. This should facilitate comparisons between sites in the future. Helen is currently working on another long-term project reviewing the data from the Three Rivers Field School stored with the Archaeological Records Management Section of the Historic Preservation Division in Santa Fe and re-categorizing the element inventories to bring them into line with the system in use at Petroglyph Monument. She plans to produce a book detailing the kinds of imagery found at the site.

Jay still organizes the photos for the Petroglyph Monument project although he is no longer able to participate in the fieldwork. Milford Fletcher, along with Jerry and Jean Brody, will be taking charge of the Creston project. Technology has advanced so fast that range-finder binoculars we were so happy to acquire only a few years ago to replace 100-meter measuring tapes are already
obsolete. Now GPS data, differentially corrected, can be automatically plotted on satellite images or topographical maps, and digital imaging is about to replace the old 35 mm single reflex lens cameras we carried. This is the equipment that will be used in the newest undertaking with which we have been associated, the Los Vecinos del Rio Petroglyph Project on the Black Mesa north of San Juan Pueblo in northern New Mexico. So our fascination with rock art and dedication to its documentation continues, even if we don’t spend much time on the rocks these days.

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Kelley, J. Charles

O Hehir, Brendan

Sofaer, Anna, Volker Zinser and Rolf Sinclair
PUBLICATIONS OF
HELEN K. CROTTY


1995a Masks Portrayed in Protohistoric Anasazi Murals: New Evidence for the Origins of Pueblo Ceremonialism. Ms. on file, Laboratory of Anthropology, Museum of New Mexico, Santa Fe.


REPORTS OF JAY C. CROTTY


AN ANALYSIS OF FAUNAL REMAINS
FROM THE MIDDEN AT ARTIFICIAL LEG SITE 12,
BERNALILLO COUNTY, NEW MEXICO

INTRODUCTION

Located west of Bernalillo on the first terrace of the Rio Grande, Artificial Leg Site 12 (or A.L. 12; LA 35493) lies within the Rio Rancho subdivision now known as Rivers Edge North. The tested portion consists of midden deposits from a site of unknown size. Units of excavation include trench sections (3 by 5 feet) and 3 by 3 feet test pits excavated in levels of six to twelve inches. Rodent disturbance was severe, and the deposits indicate a single component occupation during the Coalition period of the 13th century A.D. (Wiseman 1987; Sundt 1984).

The faunal assemblage consists of just under 500 elements which were recovered from three trench sections and an adjacent five by five foot test square. All fill was screened through quarter inch wire mesh. With two exceptions, the taxa recovered are consistent with other sites from the Middle Rio Grande Valley. Bald eagle and fish remains are the most unusual finds.

[Editor] This short but important paper was originally written in 1987 and appears here essentially in that form. No updating of information has been attempted other than citing the published references for reports that were originally cited in the 1987 version as being unpublished. This paper is published as a "period piece" because a number of studies subsequent to 1987 have referenced it, and changing its content would only add confusion to the literature.

TAXA RECOVERED

The faunal identifications were made using my personal comparative collection and those of the Museum of Southwest Biology at the University of New Mexico. Dr. Manuel Moles of the fish division of the museum identified the fish bones.

Rabbits

Both cottontail and jack rabbit are present in the collection. The cottontails are most likely the desert cotton (Sylvilagus audubonii), which is found throughout the Sonoran zone and is particularly numerous in areas where eroded hillsides are cut by arroyos but are also found along the river in tamarisk-saltgrass flats, on arid rock slopes, on mesas, on alluvial fans and in sanddrift areas within Bernalillo County (Ivey 1957). *Lepus californicus*, the black-tailed jackrabbit, is found in most habitats in Bernalillo County but is most often found in the arroyos of alluvial slopes on the sides of the river valley and in the tamarisk-saltgrass flats of the river bottom (Ivey 1957).

Jackrabbit elements consistently outnumber cottontail elements in Middle Rio Grande Valley sites dating through Pueblo III. There is some evidence that this is reversed in Pueblo IV sites, probably as the floodplain was transformed from saltgrass flats to agricultural fields. Two Artificial Leg Basketmaker III sites with fair samples of bone had cottontail to jack rabbit ratios of 1:1.5 and 1:2.8, while the Pueblo III sites, Belen Bridge and Coors Road, had ratios of 1:3.0 and 1:2.3 respec-
Artificial Leg Basketmaker III sites (Akins 1987). This species is found in all habitats throughout the state (Findley et al. 1975).

Artiodactyla

Artiodactyl elements are much less common than those from small mammals in Rio Grande Valley sites. Deer and pronghorn are almost always found, yet the numbers are low. A single element of each and only seven others that could represent artiodactyls or large mammals were found at A.L. 12, accounting for less than two percent of the total assemblage. Considerably more was found at both of the other Pueblo III sites, Coors Road with 17.9 percent and Belen Bridge with 8.0 percent (artiodactyl and large mammal).

Mule deer (Odocoileus hemionus) are found throughout the state but are more numerous in mountain-foothill habitats (Findley et al. 1975). Pronghorn (Antilocapra americana) inhabit open grasslands below woodlands and may have been relatively common east of the Rio Grande between the mountains and the river.

Birds

Four species of birds were found in the collection. The bald eagle (Haliaeetus leucocephalus) is rarely found in archaeological sites, possibly because the remains were ceremonially disposed of rather than discarded with domestic rubbish. The body parts found were phalanges and talons which could have been attached to a skin, although Beaglehole (1936) describes the Hopi method of skinning eagles as leaving the claws and head attached to the corpse.

Bald eagles inhabit shore areas and their principal food is fish (Robbins et al. 1966). In the Rio Grande Valley they are fairly common in winter at Cochiti Lake and are seen irregularly farther south (Hink and Omart 1984).
Two fragmentary elements that are almost certainly from a turkey (*Meleagris gallopavo*) were all that represent this taxon. Turkey elements are infrequent in Middle Rio Grande Valley sites dating through this time period. Turkey burials have been found at one Artificial Leg Basketmaker III site (Akins 1987) and at the Belen Bridge site (Akins 1995). Turkey elements represent less than 2.0 percent of the total at both the Coors Road and Belen Bridge sites as well as here at A.L. 12.

Wild plants that could provide natural forage for turkeys are not found along the river and human stores would be necessary when birds were kept. Three pieces of egg shell consistent with turkey in curvature and color were found but again do not suggest a greater presence.

Sandhill cranes (*Grus canadensis*) presently winter in the Lower Rio Grande Valley and are occasional as far north as Dixon. They migrate north in February and return in fall (Hubbard 1978). Early explorers describe cranes as abundant in corn fields along the Rio Grande (Bailey 1928). The Coors Road site and Puaray also contained crane elements (Akins 1987). Those from A.L. 12 include most of a sternum, a coracoid, and a portion of a femur.

Scaled quail (*Callipepla squamata*) is the most numerous of the birds found at A.L. 12. A number of the bones were partially burned or scorched, suggesting they were roasted. While it is primarily a grassland species, a few are seen at the outer margins of the riparian zone (Hink and Omart 1984). At least two of the earlier dating Artificial Leg sites have had quail represented (Akins 1987).

*Turtles*

Small pieces of turtle shell that could not be identified to species and shell, femurs, and a scapula from a painted turtle (*Chrysemys picta*) were found. Painted turtles are found in a number of habitats including rivers and ponds at rivers edges (Degenhardt and Christiansen 1974). Terrestrial turtle remains (*Terrepene ornata*) have been found at one other Artificial Leg site (Akins 1987) and the painted turtle at the Belen Bridge site (Akins 1995). Both sites had partially burned elements suggesting that turtles were eaten.

*Lizard*

A partial dentary from a lizard (*Lacertila*) was found but not identified further. Seventeen species of lizard were recorded by Hink and Omart (1984) during their biological survey. The A.L. 12 specimen most likely is a post-occupational intrusive or accidental deposition.

*Fish*

All but one of the fish elements was *Ictiobus*, the buffalofish. Two species, *I. bubalus* (smallmouth buffalofish) and *I. niger* (black buffalofish) are possible. The former is native to the lower Rio Grande and Pecos River, while the latter is found in the upper Rio Grande. Both are found in lowland, upland, bog river, and stream habitats (Smith and Miller 1986).

The fish found in prehistoric sites are often of more interest to biologists than to archaeologists. Because rivers have been modified by building dams, irrigation, pollution, and stocking of exotic and game fish, biologists often do not know which species are native to a given stream or river (Miller 1977; Moles, personal communication, 1987).

Regardless of the proximity of the Rio Grande, few sites have produced fish remains. The earliest reported come from A.L. 12 and the Belen Bridge site. This absence in earlier assemblages does not appear to result from poor preservation of fish remains in archaeological sites. The fish from both these sites are in excellent condition with even delicate spines intact. Assemblages dating before these have included sufficient amounts of rodent remains to further suggest that small remains were recovered and sampling is not a factor.
Table 1
Summary of faunal remains from Artificial Leg Site 12 (LA 35493).

<table>
<thead>
<tr>
<th>Taxon</th>
<th>N</th>
<th>MNI</th>
<th>% Heat Altered</th>
<th>Total</th>
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<td></td>
<td></td>
<td></td>
<td>burned</td>
<td>partially burned</td>
</tr>
<tr>
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<td>130</td>
<td>7</td>
<td>13.8</td>
<td>5.4</td>
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<td>Lepus californicus</td>
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<td>9</td>
<td>25.0</td>
<td>8.3</td>
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<td>3</td>
<td></td>
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<td>1</td>
<td>33.3</td>
<td></td>
</tr>
<tr>
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<td></td>
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<td>4</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>cf. Meleagris gallopavo</td>
<td>2</td>
<td>1</td>
<td>50.0</td>
<td></td>
</tr>
<tr>
<td>Grus canadensis</td>
<td>6</td>
<td>1</td>
<td>30.0</td>
<td></td>
</tr>
<tr>
<td>Callipepla squamata</td>
<td>16</td>
<td>2</td>
<td>18.7</td>
<td>12.5</td>
</tr>
<tr>
<td>Testudinata</td>
<td>5</td>
<td></td>
<td>40.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Chrysemys picta</td>
<td>5</td>
<td>2</td>
<td>20.0</td>
<td></td>
</tr>
<tr>
<td>Lacertilia</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OSTEICHTHYES</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ictiobus</td>
<td>5</td>
<td>1-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>large rodent</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>small mammal</td>
<td>62</td>
<td></td>
<td>27.4</td>
<td>8.1</td>
</tr>
<tr>
<td>medium to large mammal</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Artiodactyl</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>large mammal</td>
<td>1</td>
<td></td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>small bird</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>medium to large bird</td>
<td>2</td>
<td></td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>large bird</td>
<td>8</td>
<td></td>
<td>25.0</td>
<td></td>
</tr>
<tr>
<td>large hawk or eagle</td>
<td>2</td>
<td></td>
<td>50.0</td>
<td>50.0</td>
</tr>
<tr>
<td>small mammal/medium to large bird</td>
<td>4</td>
<td></td>
<td>25.0</td>
<td></td>
</tr>
<tr>
<td>unknown</td>
<td>4</td>
<td></td>
<td>50.0</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>485</td>
<td>33-34</td>
<td>20.4</td>
<td>7.8</td>
</tr>
</tbody>
</table>
Fish bones appear in Pueblo III and Pueblo IV assemblages from the Middle Rio Grande Valley. The Belen Bridge site had the remains of one species of fish that is no longer found in the northern Rio Grande but also has been found at a site near Cochiti. Those from A.L. 12 include a centrum and cranial parts from a single species.

The Pueblo IV sites with fish include the Taylor Ranch site where a vertebra was found (Stiner 1986) and Chamizal which has a relatively large number of fish remains (Kit Sargent, personal communication, 1986). The species identified at Chamizal include flathead (catfish (*Pylodictis olivaris*), the longnose gar (*Lepisosteus osseus*), and the smallmouthed buffalofish (*Ictiobus bubalis*).

**Unidentified Elements**

Elements that are too fragmentary to assign to a specific taxon were placed in one of a number of size-graded groups. Briefly, large rodents are the size of a woodrat or large kangaroo rat, small mammal is jackrabbit or smaller, medium to large mammal is coyote or larger, large mammal includes the artiodactyls and large carnivores, small birds are quail or smaller, medium to large birds are duck or larger, and large birds include the turkey, crane, and eagles. Unknown was used when the element could be either mammal or bird, or might represent an amphibian or reptile.

**DISCUSSION**

Table 1 gives most of the significant information on the collection. The site has been treated as a single sample and only the minimum MNI (minimum number of individuals represented) is presented. Well over half of the collection was rabbit remains which emphasizes the importance of these two species.

**Heat Alteration**

Heat alteration was recorded as complete or partial burns or scorches and is given by taxon in Table 1. The amount of burning for the sample is fairly high, but it is a midden deposit and this is as expected. Percentages are comparable to those from a trash deposit at the Belen Bridge site (Feature 20) where heat alteration percentages were as follows: cottontail 24.0, jackrabbit 37.0, small mammal 41.2, turtle 86.0, and duck 44.4. More heat alteration was found in the upper levels of fill and may have contributed to the preservation of those elements.

**Age**

A fair number of the elements were from animals that were not yet full grown (Table 2). Immature rabbits, some of which were very immature, suggest some deposition occurred in spring or early summer while the young adults could have been procured from summer into winter.

### Table 2

Percent of immature and young adult elements for those taxa in which they occur.

<table>
<thead>
<tr>
<th>Taxon</th>
<th>N</th>
<th>Immature</th>
<th>Mature</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Sylvilagus audubonii</em></td>
<td>130</td>
<td>12.3</td>
<td>11.5</td>
</tr>
<tr>
<td><em>Lepus californicus</em></td>
<td>204</td>
<td>9.3</td>
<td>14.7</td>
</tr>
<tr>
<td><em>Thomomys bottae</em></td>
<td>6</td>
<td>16.7</td>
<td></td>
</tr>
<tr>
<td><em>Dipodomys spectabilis</em></td>
<td>3</td>
<td></td>
<td>66.7</td>
</tr>
<tr>
<td><em>Neotoma albigula</em></td>
<td>1</td>
<td></td>
<td>100.0</td>
</tr>
<tr>
<td><em>Felis rufus</em></td>
<td>2</td>
<td></td>
<td>50.0</td>
</tr>
<tr>
<td><em>Grus canadensis</em></td>
<td>6</td>
<td></td>
<td>16.7</td>
</tr>
<tr>
<td><em>Callipepla squamata</em></td>
<td>16</td>
<td></td>
<td>18.7</td>
</tr>
<tr>
<td>large rodent</td>
<td>2</td>
<td></td>
<td>50.0</td>
</tr>
<tr>
<td>small mammal</td>
<td>62</td>
<td>4.8</td>
<td></td>
</tr>
<tr>
<td>medium to large mammal</td>
<td>3</td>
<td>33.3</td>
<td></td>
</tr>
<tr>
<td>unknown</td>
<td>4</td>
<td>25.0</td>
<td></td>
</tr>
</tbody>
</table>
Table 3
Percent of etched, checked, and heat altered bone by level.

<table>
<thead>
<tr>
<th>Level</th>
<th>N</th>
<th>Etched</th>
<th>Checked</th>
<th>Heat Altered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overburden</td>
<td>5</td>
<td>20.0</td>
<td></td>
<td>100.0</td>
</tr>
<tr>
<td>Level 1</td>
<td>88</td>
<td>61.3</td>
<td></td>
<td>38.6</td>
</tr>
<tr>
<td>Level 2</td>
<td>104</td>
<td>46.1</td>
<td></td>
<td>49.0</td>
</tr>
<tr>
<td>Level 3</td>
<td>111</td>
<td>39.6</td>
<td>2.7</td>
<td>32.4</td>
</tr>
<tr>
<td>Level 4</td>
<td>128</td>
<td>32.8</td>
<td></td>
<td>25.8</td>
</tr>
<tr>
<td>Level 5</td>
<td>30</td>
<td>16.6</td>
<td>6.7</td>
<td>30.0</td>
</tr>
<tr>
<td>Levels 6-9</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pothunter Dirt</td>
<td>3</td>
<td>33.3</td>
<td></td>
<td>66.7</td>
</tr>
<tr>
<td>Totals</td>
<td>479</td>
<td>40.7</td>
<td>1.0</td>
<td>35.4</td>
</tr>
</tbody>
</table>

Seasonality
As mentioned above, the presence of immature rabbits suggests at least spring through winter exploitation of these species. Other taxa that are available only seasonally were also found. Turtles indicate warm weather deposition while cranes and bald eagles are available in winter.

Taphonomic Considerations
In general, the bone was fairly well preserved. Checking from exposure was rare and less than half was etched by roots (Table 3). Etching tends to decrease with depth, as does burning. The latter may suggest some deterioration in the upper levels of fill.

CONCLUSIONS
The sample of bone from A.L. 12 is sufficient to indicate a subsistence strategy similar to that represented at other Middle Rio Grande Valley sites dating from the same time period. Rabbits formed the bulk of the animal diet with only occasional use of turkey and the artiodactyls. In addition, a variety of other animals was procured, including mice, turtles, large and small birds, and possibly fish, suggesting a broad spectrum or generalized pattern of animal exploitation.
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Stiner, Mary C.
Sundt, William M.

Wiseman, Regge N.
INTRODUCTION

Ordinarily, one does not look for substantial clues about early cultures on the interior walls of a church, especially when the vast majority of the markings from the past that might occur on those unlikely surfaces resemble nothing more than graffiti left by unthinking vandals. An initial glance at the dado (the lower portion of the walls) of the church in Mission San Miguel in the small town of San Miguel, California, leaves one with the feeling that “how could someone desecrate this Holy edifice by carving hundreds of random lines, and even leave names and dates of when these destructive acts happened.” For several years, members of the Franciscan order, as well as myriad visitors to San Miguel Mission, have noticed and commented on the extraordinary amount of scratched and abraded lines on the interior walls of the church. In general this has been dismissed as graffiti, vandalism wreaked upon the original paintings that was the handiwork of the artist Estévan Munras and his Salinan Indian workers in 1820. The meandering, incised lines at times nearly cover the entire painted dado. It is no wonder that the obvious conclusion is vandalism.

However, with proper lighting and close scrutiny, distinct design elements can be deciphered in this apparent hodgepodge of scratches, scrawls and doodles. Many of these concise drawings obviously were placed on the walls prior to the more recent graffiti. This is evident because, in the majority of the cases studied, the recent graffiti and scratches are superimposed on top of the designs.

We first considered a project to record the designs beneath the recent graffiti in 1993, five years after moving to San Miguel. However, it was not until 1999 that we were able to broach the subject to church personnel and come to contractual agreement to record the drawings.

HISTORY

The establishment of missions in North America by a variety of religious orders of the Roman Catholic Church can be traced to 1493, shortly after the discovery of America. Spain spent a great deal of time and money setting up the mission system in Mexico and was bent on extending this development to the north into the territory that became the United States. Numerous renaissances were launched into what is now the southwest part of the country over a period of 276 years. Concerned about English and Russian interests in colonizing California and the West Coast, Spain colonized the area instead.

There were certain aspects that were mandatory for the foundation of each mission. Geographically, each area where a mission was to be located was to have been suitable for living, with an abundant water supply as well as fertile acreage for crops and the breeding of livestock. In addition, there had to be a significant native population to facilitate the missionization effort. As soon as
possible after an appropriate site was located the mission fathers were responsible for construction of a church and living quarters. In return for labor for construction of the mission, the local native population was introduced to animal husbandry, European methods of agriculture, weaving, leather work, and other domestic chores.

Beginning with the first Franciscan mission founded on July 16, 1769, in San Diego, California, twenty-one missions were established extending north. Mission San Miguel Arcángel founded July 25, 1797 by Fray Fermin Francisco de Lasuén, was the sixteenth in the chain of missions. Fray Fermin Francisco, then Fray Presidente of the mission system, was assisted with the founding of San Miguel by Fray Buenaventura Sitjar, of San Antonio Mission. The site chosen for Mission San Miguel was located between San Antonio, and San Luis Obispo California, in a wide valley adjacent to the Salinas River. The area was called Las Pozas (puddles or holes) by the Spanish, and Vahia by the Salinan Indians (Bancroft 1966). Missionary work began on the day of the founding of San Miguel with the baptism of 15 Salinan children. By the end of 1800 there were 385 Salinan residents of the mission in addition to 372 head of horses and cattle and 1,582 small animals. They stored a new crop of wheat that year giving them a total product of 1900 bushels over the three years of existence (Bancroft 1966). Following the traditional criterion established by the church, construction began almost immediately on living quarters, store rooms, a granary and a church for services. The mud-roofed church was used for about a year, until after 1800 when it was replaced by a better structure (Bancroft 1966).

In short, the Mission San Miguel was making great strides toward establishing an active church and being supported by a growing number of Salinan Indians. They were treated well by the padres and soon began to live in the quarters at the mission, considering the padres and the church as a blessing. There existed a rapport between the mission fathers and the Salinan that was not evident in many of the other twenty missions. Work for the Indians at some of these other missions was heavy, tedious and difficult, and the padres treated them as serfs. Their failures were met with severe punishment. In general, for the Indians, these missions were “a disastrous experience” (Kehoe 1981:385). Mission San Miguel apparently was an exception to the procedures set by so many other missions. Between 1813 and 1815 a questionnaire called, Preguntas y Respuestas was sent from Spain requesting that the missions in the Americas send their answers regarding a number of questions concerning the mission’s associated with the natives of their areas. The following “questions and answers” briefly illustrate the connection and the allegiance between the padres of San Miguel and the Salinan Indians (Mason 1912).

Question: What language these people speak and if they understand Spanish.
Answer: The neophytes speak four languages but understand little Spanish, and that is due to the missionary fathers.

Question: Do they have any attraction or love for the Europeans or Americans?
Answer: It is 17 years since this mission was founded. During this time I have not observed that the Indians showed any aversion toward either the Europeans or Americans.

Question: Have you induced them to speak Spanish?
Answer: They have no aversion against Spanish.

Question: Which virtues are most evident?
Answer: It is my opinion that charity is the most prevalent virtue.
Have they any inclinations toward music?

They are much inclined to music and play any instrument with facility and perfection. The rest sing what the missionary teaches them.

What are their ideas of... "religion."

It appears they accept the Christian doctrine gratefully. All confess their sins and many receive communion annually.

Those excerpts from the Preguntas y Respuestas are abbreviated questions and responses of just six of thirty-six questions. All together, the responses from the mission fathers tend to support the admonition that there was special rapport between the fathers and the Salinan that would indicate a positive affiliation.

In 1806 a devastating fire swept through much of the San Miguel Mission, destroying several buildings, many provisions such as wool, cloth and hides that had been accumulated, six thousand bushels of wheat, and a portion of the church roof (Bancroft 1996:151). The padres began immediately to stockpile material needed for building a new church, and in ten years the Salinan had produced enough adobe blocks and tiles, as well as shaping wood for roof beams, to build the church. Thus the construction of the mission church which stands today began in 1816 and was completed in just two years – 1818 (Ohles 1997:2).

The church was just the beginning because an important, traditional ingredient in church history was the decoration of the interior. In 1820, a friend of father Martin - Estéfan Munras - volunteered to decorate the interior of the church. The paintings that he and his Salinan Indian helpers produced also created a unique aspect of Mission San Miguel. It is the only mission church in the string of twenty-one in California where the original paintings still exist. They have not been white-washed, plastered over, nor retouched since their painting in 1820.

PROJECT GOALS

Since 1820, when Munras began his work of painting the designs on the walls of the church, the Franciscan Fathers have been adamant that these colorful motifs remain intact, not allowing anyone to touch up or repaint any of them as deterioration took place. However, the dado area became the target for a great deal of vandalism and graffiti as described in the Introduction. The sheer amount of this damage hid a large inventory of inscribed designs that predated the abuse. Since there have been publications that depict the Munras paintings in the mission church (Foster, 1977; Neuerburg 1996; Sunset 1995), we concentrated on the designs and motifs that existed beneath the graffiti, because they also reflect remnants of a nearly two hundred year old culture.

After an intense survey of the dado in the choir loft as well as the nave, it was apparent that these concise designs displayed recognizable patterns over and beyond the simple scratching and random lines of the graffiti. This orderliness in executing designs tends to indicate that they were done consciously. That is, with a plan in mind that would reflect a desire for expressing an idea either within the mind of the person who made them for an internal gratification, or externally for others to see (an “audience” in short) as a form of communication. They are tantamount to designs on pottery, weavings, or petroglyphs and pictographs that are found universally. There is a special feeling about the San Miguel figures, even an aspect of respect since so often they depict the very milieu in which they occur - the church itself. It occurred to us that these distinct inscriptions may have been produced by the Salinan Indians who were the only congregation in the early years of the church.
There are a number of names and dates found in both the choir loft and the nave, left in later years by the early visitors to the mission church that are as much a part of the past history of the mission as any other artifact. Although scratched on the walls (an inappropriate area) they become a permanent registry dating back to 1850, after the secularization of the mission and the departure of both the Salinan and the padres. Not only do these names and dates indicate visitation in the nineteenth century, but many illustrate names of some family survivors still living in the area. It is for this reason that we expressed a desire to record the definitive remnants left by the Salinan and those later visitors, and to see that their recording would become an addition to the mission archive.

Since the vast majority of the design elements are partially covered by an extensive maze of indiscriminate, meandering lines scratched in the paint, identifying specific designs is quite difficult. In short these figures and motifs are virtually unrecognizable hidden from clear sight without close and intense scrutiny. It had become imperative that they be documented by photography and recorded for the future on discs. The reason for this requirement is that no one can predict what the future may bring; it is possible that the Church Diocese may wish to renovate the interior of the church, including replastering and painting, which would eliminate the engraved work of previous attendees.

Therefore, this project had several goals. The first was to accurately document these designs at a specific time in history (the beginning of the nineteenth century). This allows further monitoring to determine their condition and to then be able to ascertain if more graffiti or deterioration have occurred. The second was to record a valuable set of images and add them to the mission archive for use by future researchers. The third was to provide the archives with a collection of discs that document the designs, in case the designs are painted over or otherwise destroyed by renovation.

**FUNDING OF THE PROJECT**

In the year 2000, Karen Fontanneta, curator of the San Miguel Mission Museum, applied to the California Mission Foundation asking for grant money to record the designs on the interior of the mission church. She was awarded the grant to have the project accomplished.

**AREAS OF STUDY**

**Choir Loft**

A staircase along the south wall is used to gain entrance to the choir loft at the east end of the church. The loft is no longer used as a choir facility and is closed to the general public due to its fragile nature. Areas investigated and documented include the south, east, and north walls (there is no west wall).

**Nave**

East entrance, nave, sanctuary, south and north walls; reredos (altar screen).

**Sacristy**

Located off the sanctuary through a door to the north, a few designs and some graffiti occur on the wall; however, large and immovable cupboards cover nearly all of the south wall, so it is impossible to record. We recall from a few years ago seeing designs on the wall which are now covered.

**EXPERIMENTS WITH METHODS**

**Initial Survey of Site**

An overall survey of the interior of the church was essential in order to ascertain four factors: (1) the location of the designs and the placement of the camera(s) and lights for proper photography; (2) a method of moving the church pews enabling us to reach the designs; (3) a recording schedule that would not interfere with any church activities, such as Mass, baptisms, or any other endeavor or
project; and (4) limit recording to those elements deemed to fit our criteria (i.e., not include the decorated paintings of Munras).

Recording

While incorporating certain techniques common to rock art documentation we have employed over the past thirty-plus years, we discovered that recording in the church presented us with some problems (challenges) that are not encountered in the outdoors. We experimented in order to find solutions to these problems before launching into full-scale recording.

We limited this experimentation to the choir loft for several reasons. First, since the area is "off limits" to the public, there would be few or no interruptions. Second, it was an excellent and safe area to store equipment between recording sessions. Third, it provided the opportunity to try out the grid system, as well as to ascertain the best places to position the light standards (telescoping tripods).

Placement of the lighting appliances in order to correctly photograph the illusive design elements, especially the one "lost" in the maze of other lines, is crucial. This meant placing the lights at several angles and distances from the walls. We also experimented with several different types of lamps. Lamps tested included: (a) regular incandescent household, 100 watt (with reflectors); (b) special incandescent "sun" ("blue tinted") 100 watt (with reflectors); (c) studio incandescent photo floods (with reflectors); and (d) work lights 01/2M; E159682: 4G44.

The first camera we tried was a Minolta X-9 (Auto) 35mm, using Kodak Max ISO 800/30 film. Since the introduction of digital cameras had been found to give superior results, as well as being able to record directly onto discs for storage, we also borrowed a Sony digital camera for this experiment. The results were extraordinary, convincing us that this should be the method used. Mission personnel agreed. Consequently, they purchased a digital camera for the project. Each disc holds enough information to include one section at a time. Thus, one disc was used per section, with each disc identified by the number of the section. Due to the presence of both the stair case and the window opening, it was necessary to alter the grid width in three cases in the choir loft, allowing us to accommodate the difference in linear measurement.

The experimental recording began on January 1, 2001, and concluded on February 8, 2001. A total of 72 person hours was spent in the experimentation process.

EQUIPMENT AND METHODS USED FOR RECORDING

Photography

The camera used was a Sony Digital Mavica, 1.3 mega pixels, with optional floppy disc adapter (MSAC-FD2M). The camera is powered either by a battery or with an AC power adapter: AC in - 100-240 volt; DC out - 8.4V 1.5A. In addition to excellent storage capacity, this allowed the on-site advantage of examining the visuals. The lighting consisted of two work lights (01/E159682) clamped to telescoping standards and aimed obliquely at the walls. A single work light (4G44) was placed on the floor. This combination gave excellent light, revealing the designs, making them distinctive in the mass of rambling lines.

Recording in Sections

Following the standard practice in archaeology for recording rock art, a grid system was used to section off an area in consistent segments. The grid was constructed from heavy duty (1/8") wire frame. It was 15" wide by 75" high, and subdivided into five segments, each measuring 15" by 15". The sub-segments were labeled A through E, from top to bottom. The grid was held against the wall by braces, making sure that the designs(s) were located within the segments. Identification tags bearing the data and an IFRAO Standard
Photographic Recording and Color Calibration tag were attached to each segment (Figure 1).

**Sequence of Documentation**

The experimental period was most beneficial, allowing us to set up desirable working format for the actual work, which began on 8 February 2001. The south wall of the loft was chosen as the beginning location, starting at the western end adjacent to the balcony. Both balconies, here and along the north wall, are quite narrow (33" wide). They extend west from the loft and overlook the nave. Working space was quite restrictive, especially since we had to position lighting standards and still leave room for the photographer (A.J.). Using the grid to delineate each section, we worked our way eastward along the wall to the staircase that leads down to the main floor of the church (nave). Photographing around the stairwell was a major problem, and consequently, the width of the sections tended to vary at this point. Since the balcony protrudes over the nave, we next moved to the east wall and then concluded the recording along the north wall.

There is a significant amount of both designs and vandalism in the loft, perhaps because it is somewhat hidden from the nave and the sanctuary, giving people a chance to engrave without being observed from below. Proportionally, more names and dates are carved on the loft walls than in the lower main church. Recording in the choir loft was completed on March 9, 2001, after the expenditure of 80 person hours.

The second area to be documented was the main church (nave), starting with the east (main) entrance to the church. Recording was begun on the south wall on March 27, 2001, with the work progressing westward. Upon reaching the sanctuary, the crew moved to the east end of the north wall and began working westward along that wall to the sanctuary. Because church paraphernalia and furniture lined the walls of the sacristy and the sanctuary, the crew was unable to record any designs hidden behind these obstacles. A total of 165 person hours was spent recording the nave.

**Design Analysis**

With proper lighting and close scrutiny, it became apparent that recognizable designs are located on the walls and obviously were engraved prior to the more recent, random vandalism. This was evident because in the vast majority of cases studied, the random scratching is engraved on top of the designs (Figure 2). In a few instances the design would be included as part of the engraving as if enhancing it or extending its size.

We have a rather solid base by which to date the designs located on the dado, as well as the engravings above it. The painting of the walls was done in 1820-1822 (Neuerburg 1996), and all subsequent designs were engraved through the paint. Secularization of the mission in 1834 (Bancroft 1966; Ohles 1997) caused the church to be abandoned. Although it was neither sold nor rented to anyone, access to the church was easy. It is our contention that the majority of the vandalism on the walls was done in the middle 1800s to the 1900s.
Indeed, from many sources of information about the early days when the Salinan Indians were the congregation (Bancroft 1966; Engelhardt 1929; Fontanetta 2000; Geiger and Meighan 1976; Mason 1912; Neuerburg 1996; Ohles 1997), it appears that they came quite willingly to the mission. The Franciscans treated them with fairness, and in return, the Salinan were friendly and quickly became active neophytes. They learned many trades by becoming proficient with leather, iron, wood, stone and weaving at the loom. Hundreds of Indians grew the various crops, cared for the expanding vineyards, and produced an inordinate amount of wine. In short, most of the Salinan soon not only accepted but welcomed the new life style. They were fed on a regular basis, had comfortable living quarters, and were no longer threatened by Indian enemies. It appears that they held the mission and the fathers in high regard and therefore created few problems. One of the major methods of continuing friendship between Indians and padres was that Father Martin learned the Salinan language, rather than forcing them to learn Spanish or Latin.

It is quite feasible that the Salinan carried this deference in regard to the church building and would have been reluctant to despoil the church in any way. As we examined the designs that are located beneath the more recent vandalism, we became convinced that many of them display aspects of Salinan life. A new religion had entered their existence, and they may have engraved the Christian cross on the walls as a religious motif (Figure 3a), rather than as vandalism. One such motif found in the nave appears to be an engraving of the three hills of Golgatha (Figure 3b). A cross is on each hill; lines radiating from the middle one may...
Figure 5
On the north wall in the choir loft there is an accumulation of semi-circles and swirls (a), straight rectangles with cross-hatching (b), and boomerang-type designs (c). An unusual design found only in area of the loft is a sinuous and partially double-lined motif (d).

emphasize the importance of Jesus’ crucifixion. A number of designs appear to reflect Salinan Indian life away from the mission (Figures 4-6). We know they used rabbit sticks to frighten small animals into traps (Geiger and Meighan 1976; Mason 1912). The Salinan were experts using the bow and arrow, so they also carried arrow quivers. However, without clear and proper evidence, we are unable to specifically identify various artifacts from the time of the Salinan’s living at the mission.

An interesting motif, the stick figure with splayed feet and fingers, is commonly found in the cultures along the Pacific coast in central California. Two such depictions (Figure 6) are located on the north wall of the nave.

Some designs induce differences of opinion among visitors to the area. These designs are rounded in shape with what appears to be a ladder and several lines extending over the whole motif (Figure 7). One explanation, first considered by
Neuerburg (1996), is that these elements represent the old sailing vessels that the Salinan would have seen off shore and in Monterey Bay. Being a type of ship that they had never encountered before, it may well be that such an awesome sight was be sketched by Indians. The ladder could depict access to the top of the mast, and the other lines possibly represent the complex rigging.

Another suggestion was made to Karen Fontanetta (2000: 1-8) when she was showing the paintings and engravings in the church to three members of the Salinan council. While looking at one of these enigmatic designs (Figure 8), one of the council members quickly proclaimed “Why that’s a sweat!” He pointed out what he considered was the ladder used to enter the sweat-house and the frame work for the tule. Further information came forth from other Salinan, who basically supported the idea that the design was indeed a sweat-house.

Still the concept of the design being a replica of a sweat-house is difficult to accept. First, the majority of the Salinan sweat-houses were built on the ground over a shallow pit. There would have been no need for a long ladder to enter the lodge, and a roof made from the bulrushes and thin poles would not support human weight. A typical sweat-house of the coastal Indians (Figure 9) indicates the fragility of the structure and illustrates the entrance at ground level. However, we have been unable to find significant information that clarifies this conundrum.

A concluding comment on our premise is that the designs discussed in this paper were compared with those left at the Painted Cave located on the grounds of Fort Hunter Liggett (Figure 10). This shallow cave is more of a large shelter than a cave,
and was a center of ancient Salinan life (Mason 1912). Grinding holes are in the floor and pictographs are around the interior walls.

CONCLUSION

By 1831, the entire mission system was informed that their tenure was nearly over. Spain no longer supported the missions since Mexico had won its independence, and the first Mexican governor issued an illegal decree that required the missions to release any Indians who wanted freedom. Even after a commissioner came to San Miguel and explained what freedom meant to the Salinan, they desired no change and refused to leave. Secularization came in 1834, and Mission San Miguel was confiscated. Then in 1841 the last Franciscan, Fray Abella, left (Englehardt 1929). The mission had had 340 Salinans, but by 1842, there were only 30 (Hester 1978:8:505).

Although the myriad designs located on the interior walls of the Mission San Miguel Church are integrated with an agglomeration of chaotic vandalism and graffiti, it still presents unmistakable imagery of symbolism left by early peoples who were familiar with the church by means of regular and meaningful attendance. The Salinan Indians were the dominant congregation throughout the church's 43 years of existence. The statements of the mission fathers concerning the amicable relations between the Franciscans and the Salinan (Mason 1912), combined with the similarity of design elements between Painted Cave and the mission church, suggest that the majority of the recognizable designs beneath the more recent graffiti were probably left by those Salinan.

Few locations in the general area contain Salinan petroglyphs and pictographs, the major site being Painted Cave on the Fort Hunter Liggett property. The similarities between these design elements and those in the church are quite striking. This does not preclude the possibility that some of the graffiti might also be the work of local, non-Indian the town dwellers who settled the area throughout the secularization period.

The names and dates engraved in the walls do fall under the nomenclature of vandalism. Still, names that were carved in the nineteenth century are remnants of the early history of the mission, especially when they reflect ancestral names of the people who founded the town of San Miguel, as well as family members who still live in the area.

In the past, the Franciscans, as well as the Diocese itself, have wanted to maintain the San Miguel Mission. Since they feel obligated to encourage the preservation of their past history, it seems mandatory that the part of that history that remains engraved in the walls of the church should also be a component of that premise.
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PROBLEM-ORIENTED RESEARCH AND ROCK ART IN NEW MEXICO

One of the curious facts in connection with petroglyphs is the meager notice taken of them by explorers and even by residents other than the Indians, who are generally reticent concerning them.

[Garrick Mallery 1893:36]

To bring Mallery to date, note that until recent years petroglyphs and pictographs, which are collectively call “rock art”, remained “curious facts” that the North American archaeological community with rare exceptions continued to “meager notice take(n)”. Largely for that reason, archaeological investigations of these expressions still ordinarily concentrate upon the fundamental first steps of any scientific endeavor: to locate, describe and classify a particular phenomenon or sets of related phenomena. But what happens to archaeological data that are collected primarily as descriptive documents? Of what research use to archaeology are objective descriptions that are collected with no particular research problem in mind? What relevance can such data have in an archaeological universe that is largely committed to problem-oriented research? These are among the issues concerning data collection about rock art in New Mexico that are addressed here.

The plan of this paper is first, to discuss the history of rock art recording in New Mexico and place it within broader historical contexts, second to discuss the systematic collection processes for rock art data in New Mexico as they have evolved during the last few decades, and third, to briefly discuss the analysis of rock art that has been and can be generated by the kinds of information that emerge from encyclopedic data collection processes. The not-so-well-hidden agenda is three-fold. First, to demonstrate both the utility and the necessity to systematically describe rock art in terms of the natural and cultural environments where it is found, second, to show the importance of collecting those data, not only for their own sake, but also because they can reveal patterns to researchers that might otherwise remain invisible, and third, to demonstrate the importance of ensuring that objective and systematically comparable descriptions of rock art are made available to future researchers in well-managed public archives.

IN THE BEGINNING: LOCATE, DESCRIBE, CLASSIFY

There is little evidence for the observation or recording of rock art in New Mexico by Euro-American explorers, visitors or emigrants before about the middle of the nineteenth century. Spanish records pay scant attention to it although there is ample evidence in the form of Hispanic inscriptions and petroglyphs at ancient rock art sites to confirm their familiarity with the art (Figures 1, 2).1 For the most part the earliest documentation of ancient southwestern rock art, as elsewhere in North America from the seven-
on the march, they received permission to observe and explore archaeological sites including petroglyph concentrations. Simpson was one of a small group of West Point-trained military topographers sent to the Southwest during its American occupation to provide strategic topographic military advice, to map the areas that they visited, and to collect information about local natural and human resources. To some degree all had received training as naturalists and ethnologists, and their descriptive and taxonomic work in archaeology, ethnology, geology, botany and zoology all falls well within the parameters of the contemporary discipline of natural history (or "natural science"). Kern was one of a small group of professional
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teenth century onward (see for example the Dighton Rock (Figure 3) in Massachusetts), are impressionistic verbal descriptions and field sketches by non-Hispanic Euro-Americans who came to the Southwest during and after the second quarter of the nineteenth century (Mallory 1893; Schoolcraft 1851-1857). Among the most accurate and objective of these are the verbal and visual sketches compiled at Canyon de Chelly (then part of New Mexico), Chaco Canyon and El Morro in 1849 by Lieutenant James H. Simpson, a U.S. Army Topographical Engineer and his assistant, expeditionary artist and largely self-taught naturalist Richard H. Kern (Figures 4, 5) (McNitt 1964; Weber 1985).

Simpson and Kern were attached to a military expedition when, in line with their duties while
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artists who, during the first half of the nineteenth century, before cameras had become even marginally useful for such purposes, were hired to visually document Government-sponsored explorations of the far west. During his brief career - he was killed by Utes while with the Gunnison Expedition in 1853 - Kern became a skilled and accurate reporter on the natural sciences and anthropology of the region (Weber 1985).

Until more than a century later, even as other kinds of archaeological and anthropological studies in the Southwest became more specialized, rigorous, fine-grained and problem-oriented, the examination of rock art generally remained no more elaborate than in the time of Simpson and Kern. Few professional archaeologists paid more than minimal attention to it and many ignored it entirely. By default, analysis and interpretation of rock art, development of rock art recording systems, and the systematic field collection of rock art data were all largely left to non-archaeologists and the avocational archaeological community (see for example Gebhard 1957 and Newcomb and Kirkland 1967 among others).

There is a clear and obvious parallel here to the development of the descriptive and taxonomic foundations of the natural history disciplines during the eighteenth and nineteenth centuries, most especially to the accumulation in that era of massive numbers of systematically documented field collections that ultimately came to be curated for the academic community at natural history museums. The systematic tools and philosophical underpinnings of the natural sciences as well as those irreplaceable scientific collections were made possible by a worldwide network of thousands of generalists. Many of these were, like Kern, highly committed but indifferently educated adventurous souls hired by governments or entrepreneurs to explore potentially lucrative “new” territories. Many others were learned, leisured dilettantes wealthy enough to travel to far places in order to explore and report on exotic environments, or to pay others to do so. Still others were amateur collectors - hobbyists - of diverse backgrounds who lived and worked in European colonies scattered throughout the world. Today, the descriptive foundations of rock art studies and the field collecting of rock art data in most parts of the United States including New Mexico, are largely a product of the twentieth century equivalents of those earlier amateurs, polymaths, and self-taught naturalists, most especially a new leisure class of well-educated retirees with a broad range of life and work experiences.

When Col. James G. Bain, a retired army officer, directed the first Archaeological Society of New...
**CELESTIAL BODIES AND WEATHER PHENOMENA**

- a) bird
- b) crescent moon shape
- c) lightning
- d) rainbow
- e) "cloud terrace"

**MYTHOLOGICAL BEINGS**

- a) alien
- b) crocodile
- c) dinosaur
- d) horse
- e) "mythological" figure
- f) prehistoric reptile
- g) "prehistoric" anthropomorph
- h) "prehistoric" anthropomorph
- i) "prehistoric" anthropomorph
- j) "prehistoric" anthropomorph

**MULTIPLE-ELEMENT COMPOSITIONS**

- a) complex panel with life forms
- b) complex panel with life forms
- c) complex geometric (not textile or pottery)
- d) complex continuous-line geometric
- e) complex continuous-line with the life forms

**MISCELLANEOUS (ASSUMED PREHISTORIC) ELEMENTS**

- a) uncurved form
- b) possible human
- c) possible bird
- d) possible bird
- e) possible human
- f) possible human
- g) possible human
- h) possible human
- i) possible human
- j) possible human
- k) possible human
- l) possible human
- m) possible human
- n) possible human
- o) possible human
- p) possible human
- q) possible human
- r) possible human
- s) possible human
- t) possible human
- u) possible human
- v) possible human
- w) possible human
- x) possible human

**HISTORIC (c. 1550-1950) SYMBOLS, FIGURES, AND INSCRIPTIONS**

- a) initials/names/dates
- b) weapon
- c) vehicle
- d) Christian cross
- e) horse
- f) human figure
- g) equestrian figure
- h) Christian cross
- i) Pueblo ceremonial/deity figure
- j) Apache ceremonial/deity fig.
- k) Apache ceremonial/deity fig.
- l) Apache ceremonial/deity fig.
- m) Apache ceremonial/deity fig.
- n) Apache ceremonial/deity fig.
- o) Apache ceremonial/deity fig.
- p) Apache ceremonial/deity fig.
- q) Apache ceremonial/deity fig.
- r) Apache ceremonial/deity fig.
- s) Apache ceremonial/deity fig.
- t) Apache ceremonial/deity fig.
- u) Apache ceremonial/deity fig.
- v) Apache ceremonial/deity fig.
- w) Apache ceremonial/deity fig.
- x) Apache ceremonial/deity fig.
- y) Apache ceremonial/deity fig.
- z) Apache ceremonial/deity fig.

**RECENT GRAFFITI AND HUMAN-CAUSED DAMAGE (NOT DIRECTLY IMPACTING ROCK ART)**

- a) initials/names/dates
- b) worked natural hole
- c) grinding slick
- d) rock wall
- e) rock wall
- f) rock wall
- g) rock wall
- h) rock wall
- i) rock wall
- j) rock wall
- k) rock wall
- l) rock wall
- m) rock wall
- n) rock wall
- o) rock wall
- p) rock wall
- q) rock wall
- r) rock wall
- s) rock wall
- t) rock wall
- u) rock wall
- v) rock wall
- w) rock wall
- x) rock wall
- y) rock wall
- z) rock wall

**MISCELLANEOUS MODIFICATIONS**

- a) bullet scar(s)
- b) bullet scar(s)
- c) bullet scar(s)
- d) bullet scar(s)
- e) bullet scar(s)
- f) bullet scar(s)
- g) bullet scar(s)
- h) bullet scar(s)
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- j) bullet scar(s)
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- m) bullet scar(s)
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- t) bullet scar(s)
- u) bullet scar(s)
- v) bullet scar(s)
- w) bullet scar(s)
- x) bullet scar(s)
- y) bullet scar(s)
- z) bullet scar(s)

**HISTORICAL DESTRUCTION AFFECTING ROCK ART PANEL**

- a) scratches/incised lines
- b) scratched/incised lines
- c) scratched/incised lines
- d) scratched/incised lines
- e) scratched/incised lines
- f) scratched/incised lines
- g) scratched/incised lines
- h) scratched/incised lines
- i) scratched/incised lines
- j) scratched/incised lines
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- t) scratches/incised lines
- u) scratches/incised lines
- v) scratches/incised lines
- w) scratches/incised lines
- x) scratches/incised lines
- y) scratches/incised lines
- z) scratches/incised lines

**ASSOCIATED ARCHEOLOGICAL FEATURES**

- a) cupule
- b) worked natural hole
- c) grinding slick
- d) bedrock morter
- e) rock wall
- f) worked stone
- g) sherds
- h) worked stone
- i) worked stone
- j) worked stone
- k) worked stone
- l) worked stone
- m) worked stone
- n) worked stone
- o) worked stone
- p) worked stone
- q) worked stone
- r) worked stone
- s) worked stone
- t) worked stone
- u) worked stone
- v) worked stone
- w) worked stone
- x) worked stone
- y) worked stone
- z) worked stone

**Defacement of Rock Art Elements or Panels**

- a) scratches/incised lines, fishtail
- b) scratches/incised lines, fishtail
- c) scratches/incised lines, fishtail
- d) scratches/incised lines, fishtail
- e) scratches/incised lines, fishtail
- f) scratches/incised lines, fishtail
- g) scratches/incised lines, fishtail
- h) scratches/incised lines, fishtail
- i) scratches/incised lines, fishtail
- j) scratches/incised lines, fishtail
- k) scratches/incised lines, fishtail
- l) scratches/incised lines, fishtail
- m) scratches/incised lines, fishtail
- n) scratches/incised lines, fishtail
- o) scratches/incised lines, fishtail
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- q) scratches/incised lines, fishtail
- r) scratches/incised lines, fishtail
- s) scratches/incised lines, fishtail
- t) scratches/incised lines, fishtail
- u) scratches/incised lines, fishtail
- v) scratches/incised lines, fishtail
- w) scratches/incised lines, fishtail
- x) scratches/incised lines, fishtail
- y) scratches/incised lines, fishtail
- z) scratches/incised lines, fishtail

**Natural Deterioration Affecting Rock Art Panel**

- a) recent spalling
- b) recent spalling
- c) recent spalling
- d) recent spalling
- e) recent spalling
- f) recent spalling
- g) recent spalling
- h) recent spalling
- i) recent spalling
- j) recent spalling
- k) recent spalling
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- v) recent spalling
- w) recent spalling
- x) recent spalling
- y) recent spalling
- z) recent spalling

**Special Features**

- a) rock incorporation
- b) enhancement of rock edge
- c) enhancement of rock edge
- d) enhancement of rock edge
- e) enhancement of rock edge
- f) enhancement of rock edge
- g) enhancement of rock edge
- h) enhancement of rock edge
- i) enhancement of rock edge
- j) enhancement of rock edge
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- v) enhancement of rock edge
- w) enhancement of rock edge
- x) enhancement of rock edge
- y) enhancement of rock edge
- z) enhancement of rock edge

Since 1966, the ASNM program, its goals, and its field methods have all gone through several transformations. Most obvious are technical improvements in field recording and mapping methods and parallel refinements in descriptive documentation, especially creation of systematic, uniform data collection and classification procedures. Of critical value was the desire to make rock art recording throughout New Mexico as mutually compatible and mutually comparable from site to site and among investigators as is possible. The foundation for these refinements was a philosophical change that occurred with seeming inevitability during the 1970s. In that decade, ASNM rock art activities shifted focus from efforts to develop a state-wide site inventory to inventing procedures for compiling inventories that document all visible human-made marks on rock surfaces at locations called "rock art sites" whose parameters are defined by the investigator.2

Nonetheless, the initial objective, to systematically locate and describe all rock art in New Mexico, remains conceptually unchanged even though it seems unattainable on a practical level. There are an unknown number, perhaps thousands, of rock art sites in New Mexico and they contain hundreds of thousands of images. Since the late 1960s, ASNM, its affiliate societies and other organizations and individuals have deposited records in state archives that identify may hundreds of rock art sites including several dozen that are fully documented. The archive of choice, long associated with the Laboratory of Anthropology of the Museum of New Mexico in Santa Fe, is called ARMS (Archaeological Records Management Section) and is currently an agency of the State Office of Cultural Affairs. Rather than a passive player in the documentary process, ARMS' archival requirements significantly affect documentation procedures.
There is no known existing tally of rock art site records that are on deposit there but some impressions are worth noting. Many hundreds of them are relatively brief descriptions that locate rock art sites and provide notations, sketches, and photographs of prominent images or clusters of images. More impressive by far are the relatively few sites represented in the archive by massive volumes of paper and photographic records that amount to being total inventories of pictorial images and other human-made marks (collectively called "elements") that were seen at those rock art sites. Well over 30,000 discrete pictorial elements systematically surveyed, drawn, photographed, described, mapped, and categorized at sites located in all parts of New Mexico are deposited at ARMS and available to researchers. That number should double within the next few years when materials from on-going projects are also made available.

The development of systematic recording methods for rock art is complicated by the many variables that characterize rock art sites. Their only consistency is the presence of human-made drawings on stone, but different geological and other environmental factors can result in radically different configurations, distributions, visual qualities, and legibility of rock art. Paintings on rocks (pictographs) are quite different from pecked or engraved images (petroglyphs) and those differences may require substantially different recording methods. Further, recording procedures are structured by such physiographic factors as the terrain, and by human ones such as the density of pictorial elements which can vary greatly from site to site depending on who made them and when and why, and by how they have been treated over time by nature and by humans.

A brief look at the time invested in preparing rock art documentation underlines a major reason why so much of it is generated by volunteer avocational and student rock art recorders. Although documenting rock art is a pre-condition to doing any sort of analytical or interpretive research about it, systematic site inventories are generally too labor-intensive to be economically feasible. For example, an element inventory that began at Petroglyph National Monument (PNM) in Albuquerque in February, 1997 and is projected to be completed in 2004 had, by mid-summer of 2002, counted 24,280 elements including about 4,500 graffiti inscriptions (Ward 2002). As of September 30, 2002, PNM inventory crew volunteers had logged almost 13,000 field hours, the equivalent of more than six years of full-time employment. Thus, they have collectively recorded not quite two elements for each hour worked. At a conservative $10.00 an hour, the labor cost of documentation thus far is over $121,400. Excluded from the calculation are supplies, facilities, management costs and an unknown number of hours spent by National Park Service employees collating documentary materials, entering the data into a GIS (Geographic Information System) program in order to make them useful, and other NPS support services including field work.

The goal of the current project is a 100% inventory that entails looking at all possible faces of the cap rock of a rugged volcanic escarpment that would measure about 28 km in length if laid out as a straight line, and of tens of thousands of basalt boulders on talus slopes below it. Four volunteer teams of three- or four-persons each, mostly affiliated with the Albuquerque Archaeological Society, working one day a week, have done almost all of the inventory work. Teams spend four or five hours in the field each work day when weather allows, usually about forty days a year, followed by another hour or two of paper-work.

The reliability of the PNM inventory ratio of the time spent to record elements may be evaluated to some degree by comparison with two other projects: a 1985 archaeological survey of the Petroglyph Monument landscape by a team of professional and student archaeologists, and a total rock art inventory conducted by the ASNM Rock Art Field School between 1987 and 1992 at Three Rivers, New Mexico. The 1985 study, pre-
pared for the City of Albuquerque about five years before the Monument was established, was a six-month-long project by six archaeologists directed by Matthew F. Schmader and John D. Hays (Schmader and Hays 1986). It is the least comparable of the three, for rather than being a systematic inventory of a rock art site, it was an archaeological site survey of the escarpment and its vicinity that only sampled the rock art of the survey landscape. The scope of work, unlike the other two projects, was severely limited by constraints of time and money, but despite those limitations, the survey crews counted about 10,500 petroglyphs in 130 concentrations. Assuming about a 30% undercount, Schmader and Hays estimated that a full inventory would document about 14,000 petroglyphs. Considering the terrain and the above-noted limitations the undercount, currently about 75% and rising, was not unreasonable. No estimate of the hours spent on the survey is available and other differences between that project and the current one are so great that it is not possible to calculate a comparable ratio of time spent to record rock art elements.

However, a similar ratio of about two elements documented for every hour of logged labor was achieved by the ASNM Rock Art Field School in a project done for the Bureau of Land Management (BLM) at the Three Rivers Site north of Tularosa (Duran and Crotty 1999:1-2, 39, Table 2). In many respects the Three Rivers inventory was the model for the Petroglyph Monument inventory. For both, a federal agency needing base-line information about large concentrations of rock art in order to better articulate and develop its management goals, contacted the ASNM Rock Art Field School to enlist its expertise to help create an efficient volunteer-dependent recording program (see Fletcher, Mich and Saville, this volume).

Three Rivers is a much smaller but far more compact site (0.56 sq km) than PNM and some field recording methods used there, especially mapping, differed from the more recent project. ASNM volunteers logged about 10,000 person hours in field and laboratory work there to document 21,382 elements or something over two-per-hour. There also, the rock art is on basalt boulders in a treeless landscape, a kind of terrain that imposes its own recording pace. Rock art made in other geological and environmental settings, such as on sandstone canyon walls or in riparian areas, or that is documented using somewhat different procedures, for example with scale drawings, would produce different ratios of labor to document production. But it is fair to postulate that a ratio of about two rock art elements recorded for each hour of field work is a reasonably efficient standard making it unlikely that any but the smallest rock art sites can be fully and systematically documented without significant contributions by unpaid recorders.

**SYSTEMATIC ROCK ART DATA COLLECTION IN NEW MEXICO**

The methodological principles that drive the natural sciences in fields such as biology and geology are also basic to the conduct of field archaeology including rock art recording. Summarized, those are to describe, classify and analyze a phenomenon, always keeping in mind the necessity of testing the results of analysis. Since no two archaeological sites are ever exactly alike, exact replication of results can never be more than a pious hope, especially if site disruption or destruction takes place during or after the time that data are collected. Systematic description is at the heart of the ASNM rock art recording methods for in the absence of agreed-upon descriptive criteria and procedures no two descriptions can be objectively compared, no classification categories can be considered comparable, and no two analyses can be measured each against the other. Yet, even though the goal of producing data that has the best chance of being analytically useful has structured ASNM rock art recording methods, the fact is that rock art recorded by ASNM and its affiliate societies has produced few published analyses and ASNM collected rock art data has rarely been
used to address complex research problems. Before examining those issues it is necessary to describe the basic recording procedures.

Crotty (2000) discusses the evolution of rock art recording in New Mexico and shows that the parameters of present-day recording formats, in place since 1975, differ in relatively few ways from suggestions made by Schroeder in 1966. For example, he asked that recorders note “overlapping figures” (superimposition), “differential weathering” (patination) and other indicators of relative age, all of which are among key data bits required by ASNM recording procedures. However, some differences are significant, especially those deviating from the ideal of systematically taking note of “...nearby ruins, trails, or other items that (may indicate) contemporary associations.” and “...description(s) of the immediate environment.” (Crotty 2000:108). Except for certain site records required by ARMS, rock art recording forms used by ASNM provide few opportunities to systematically describe such features and many rock art recorders are not trained to recognize them. The problem is mitigated for multi-team projects such as characterize ASNM field schools and most affiliate society rock art recording. For those, observations of the environment and other archaeological features are ordinarily recorded by the project coordinator, rather than by individual rock art inventory teams.

Most ASNM and related recording projects involve teams of two, three, or four people, depending on field conditions and other factors. Once the pictorial units (elements) to be recorded have been located, there are three key components to the recording process: mapping the rock, panel, or other discrete surface (“locus”) on which the elements are located, photographing each locus, and systematically describing each. Key descriptive factors include a field sketch to visually record the elements at a locus as they appear at the time they are drawn, measurements, and

### PHOTO DATA SHEET

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mapper: ________________________</td>
<td>________________________</td>
<td>Sheet_</td>
<td>Date_</td>
</tr>
</tbody>
</table>

**Geographic Location:**

| N | E | Precision on Sheet | GPS:________ |
| N | E | ______________________ | Sheet_ |

**Design Element (Image) Inventory Key (illustrated):**

<table>
<thead>
<tr>
<th>Linear Designs</th>
<th>Curved Lines</th>
<th>Mixed Curved/straight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Linear Designs</td>
<td>2. Curved Lines</td>
<td>3. Mixed Curved/straight</td>
</tr>
<tr>
<td>Simple Straight Lines</td>
<td>Angled Lines</td>
<td>Curved Lines</td>
</tr>
<tr>
<td>- a) single straight line</td>
<td>1) angled line</td>
<td>c) curved line</td>
</tr>
<tr>
<td>- b) parallel straight lines</td>
<td>2) parallel angled lines</td>
<td>d) curved line</td>
</tr>
<tr>
<td>- c) single X</td>
<td>3) single zigzag</td>
<td>e) curved line</td>
</tr>
<tr>
<td>- d) single zigzag</td>
<td>4) single curved line</td>
<td>f) curved line</td>
</tr>
<tr>
<td>- e) single pole ladder</td>
<td>5) wavy line</td>
<td>g) curved line</td>
</tr>
<tr>
<td>- f) two-pole ladder</td>
<td>6) grouped wavy lines</td>
<td>h) curved line</td>
</tr>
<tr>
<td>- g) forked line</td>
<td>7) multi-curved line</td>
<td>i) spiral or scroll</td>
</tr>
<tr>
<td>- h) branched line</td>
<td>8) unidentified open linear</td>
<td>j) spiral or scroll</td>
</tr>
</tbody>
</table>

**Figure 7**

Design Element (Image) Inventory Key (illustrated). October 2002 version, top of page 1 of 4, ASNM Rock Art Field School.

**Figure 8**

Photo Data Sheet. Current version, ASNM Rock Art Recording Field School.
assignments of appropriate taxonomic categories for each element based upon a uniform category guide (Figures 6, 7). Categories are numbered for ease of electronic data entry and are devised to provide uniform, objectively-worded identification of elements known to occur in New Mexico rock art. Category lists were first formalized in the 1980s by Helen Crotty with input from a number of sources including ASNM Rock Art Field School participants. Helen Crotty is also responsible for most subsequent revisions including the most recent (November, 2002) that includes about 200 categories.

Team discipline structured by paperwork is necessary to establish a systematic, objective and comparable data base. The central figure in the ASNM system is the person, often called “artist” but more accurately identified as “recorder”, who manages the most important field record, the “Photo Data Sheet” (Figure 8). Spaces on that form are reserved for virtually every class of descriptive information including mapping or GPS location, site, locus, and photograph identification numbers, drawing, metric measurements, directional data ("facings"), taxonomic categories, patination, method(s) of manufacture of the rock art, notations of superimpositions, vandalism, ancillary features such as grinding slicks, potsherds, unusual flora, spatial relationship to other loci and to the landscape, sheet control number, LA site number, field number, date of the recording and the names and job titles of the team members. All other field records refer back to the Photo Data Sheet and, regardless of who takes measurements, makes photographs or does the mapping, the person in charge of the Photo Data Sheet orchestrates field data collection while making every effort to record all observations on site.

Black and white photographs and negatives are preferred for their archival longevity making SLR cameras with zoom lens, polarizing filter and fast (ASA 400) black and white film the generally preferred tool. Color slides have a much shorter archival life than black-on-white film but still may be used to supplement basic photographs. Digital photography may well replace film in the future, but doubts must first be resolved about the archival life of digitally stored data in comparison with paper or film. Each field photograph includes as part of the image a Photo Data Board (“mug board”) on which is a unique, sequential photo number that is recorded on both the Mapper’s Sheet and the Photo Data form (Figures 2, 8). The photographer ensures that each photograph is identified by the correct photo number and that the mug board is legible in each photograph.

Fletcher, Mich and Saville (this volume) discuss mapping with GPS (Global Positioning System) and GIS technologies which together can integrate location information about rock art with a broad spectrum of other kinds of data. The relative ease of use, accuracy, and flexibility of these new technologies has not only made mapping of rock art sites much less difficult than in the past especially in rough terrain, but more significantly, simplifies a broad spectrum of research possibilities. Nonetheless, mapping procedures developed over many years at a variety of rock art sites by Jay Crotty using surveyors tapes, compasses, and other traditional mapping tools are still accurate and useful, and analyses dependent upon manipulating physiographic data can still be done in the absence of GIS technology. GPS and/or mapping field records are kept by the mapper or GPS recording person and include Photo and Locus numbers, locus measurements and other mapping data for each locus. Frequent cross-checking among the recorder, mapper, and photographer is crucial to avoiding recording errors.

WHERE DO WE GO FROM HERE: TEASING MEANINGS FROM THE DATA

Rock art is always conceived and performed in a landscape and each pictorial element is somehow integrated with that environment. For that rea-
son, no analyses of rock art can be complete, let alone interesting, that do not take account patterns of interactions between and among images and their physiographic settings. “Why here instead of there?” “Why this cluster of elements in this place and that cluster in another?” “Why is this image in the full sun at noon on a spring day while that one is in the shade?” “Why do some visual elements appear together while others seem to be mutually exclusive?” “Why do the most dramatic images here cluster near springs while the most dramatic ones there are on high ridges?” Such questions can emerge from and their answers be suggested and tested by the patterns of interaction that emerge from the data bases produced by full-scale inventories of rock art sites. Distribution analyses of images recorded in a particular geographical setting can establish stylistic affinities, suggest relative dating and past ethnic, religious or other affiliations and interactions. But, until now, the masses of data accumulated by total inventories of rock art sites. Distribution analyses of images recorded in a particular geographical setting can establish stylistic affinities, suggest relative dating and past ethnic, religious or other affiliations and interactions. But, until now, the masses of data accumulated by total inventories of rock art could not easily be sorted or manipulated by researchers, thus limiting their analytical value. The flexibility of GIS programming technology now allows investigators to, on the one hand browse through an almost infinite number of observations about rock art elements in their physiographic settings in a search for potentially meaningful patterns and, on the other, look for specific kinds of relationships that are pertinent to a previously defined research problem. What was once cumbersome is now supple.

Data driven, interpretive investigations based upon distributional patterning of rock art in a landscape are among the most fruitful analytical modes for its study and their history pre-dates modern electronic data management. One of the first systematic studies of rock art by modern anthropologists, and perhaps the first ever supported by the National Science Foundation, was conducted by Robert F. Heizer and Martin A. Baumhoff of the University of California, Berkeley, in the California-Nevada desert from 1959 to 1961. They surveyed and located 141 petroglyph sites, recorded observations about landscape and other archaeological features, classified several thousand individual elements, and then hand-sorted their data for analysis. Their conclusions, based on distributional patterns of all of those factors, remain valid and not only provide the framework for all other studies done in that region, but for all later studies of Desert Archaic rock art. They are worth citing: “...most Nevada petroglyphs have ‘meaning’ in terms of one of the hunting patterns of the prehistoric inhabitants...more specific meaning (that) may be attributed to them is less certain and less subject to proof...we feel that the glyphs themselves, or the act of making them, were of magico-religious significance, most probably...to insure success of the hunt. The recent Great Basin tribes did not use petroglyphs...in fact, deny having made them for any reason.” (Heizer and Baumhoff 1962:11).

Several recent rock art studies that largely rely upon analyzing patterns of distribution of rock art and other socio-cultural and environmental features within a landscape are cited in this volume by Fletcher, Mick, and Saville. All are based upon the data-collection methods described above, on data entry into a GIS system, and on manipulation of those data to either find patterns, test hypotheses, or both. The first use of the technology may have been in a study by Denise Smith to collect and analyze data for her doctoral dissertation in Art History (1998; 2002). Her achieved objective was to distinguish iconographic and stylistic qualities among a diverse group of images that could expose temporal and ethnic clusters relating to and explicating the known history and distinctive landscape features, especially Abo Pass, of Abo Pueblo.

A much broader geographical range is covered in a more recent, somewhat similar distributional study by Marit Munson for her doctoral dissertation in Anthropology (2002) using similar data-gathering and analytical methods, though not a GIS program. Munson’s analysis clarifies stylistic and iconographic changes on the Pajarito Plateau during the transition from the Coalition to the
Classic Period and, in an explanatory way, relates them to significant modifications in social and religious systems on the Pajarito Plateau during the Pueblo IV period. Her analysis and conclusions suggest some future research directions that might be addressed by data already collected at Petroglyph Monument.

Further, rock art documentation already collected, there, at Three Rivers, and from other fully inventoried sites already in the archives are potentially rich with suggestions for GIS-based studies. For example. "Do the data support the impression that certain medicinal plants are more common in areas rich in petroglyphs than in other locations. If so, why?" "Most ancient rock art elements in New Mexico seem to be placed in an arc facing south-east to south-west. Is that true also for modern graffiti? For non-Pueblo elements? Are there other distributional clues to suggest explanations for the phenomenon? "Can the data explain why configurations of elaborate images occur in different landscape settings and in relationship to other archaeological features? And so forth. So long as data that have been systematically and encyclopedically recorded are made available, they can and will generate an infinite number of investigations.

More often than not rock art investigations seem to have focused upon iconographic issues that tend to lay stress upon individual pictures and to ask questions on the order of "What is the meaning of this image?" Since things can mean only what people say they mean and those who could have responded to such questions may be long gone, reliable definitive answers can hardly be expected leading to endlessly futile logical constructs. To approach questions of meaning obliquely may be counter-intuitive judging by the relatively few researchers of rock art imagery who seem to have used the approach but there is much to be said in favor of blank-minded, data driven methods. Since they take investigators step-by-step from the known through the unknown to the unknowable, answerable questions emerge that may never before have been considered, and unanswerable ones that might otherwise have been asked are avoided. Further, the reliability of data-inspired interpretations can be measured - they are as testable and replicable as is possible in archaeology.

Failure to phrase answerable questions, to properly evaluate the reliability of answers and to recognize the knowable from the unknowable all contribute to the frustration of rock art researchers - and their audience - hoping to find intellectually fruitful ways to understand that compelling art. Perhaps the greatest error in the past has been the failure to realize that, because rock art images are inseparable from the landscapes where they were made, their meanings also are inseparable from that landscape. Because the art is so profoundly site-specific, let the art in its landscape generate the research questions and show the way to finding fruitful answers.
END NOTES

1 The 1605 inscription by Juan de Oñate at El Morro is among the oldest Spanish messages made at an ancient Pueblo rock art site. Petroglyphs by Hispanic sheep-herders and farmers are also recorded and Christian crosses are common at some places. Some were made as statements of faith by Hispanic or Pueblo Catholics, but others are known to have been made by Hispanics in exorcism rituals (Carillo in Schneider and Hays 1986:5.9).

2 Inconsistency is the rule in defining a rock art "site". Some are only a single boulder, others are miles long, and still others are determined by land ownership or some other arbitrary historical event. ARMS plays a critical role in determining how sites are to be identified.

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McNitt, Frank (ed.)

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Schmader, Matthew E. and John D. Hays
Simpson, James H.

Schoolcraft, Henry R.

Smith, H. Denise


Ward, Gretchen
2002 Current Inventory Figures, e-mail message, 4 October 2002, to Petroglyph National Monument Staff and Inventory Crew volunteer leaders Jack and Ann Francis.

Weber, David J.
Recent research of DNA has led to a great deal of new data useful in studies of the human past. Three major areas of research have emerged. Most prominent are investigations of broad scale population movements, usually involving a continental or even a global perspective, such as the spread of the Indo-European languages in Europe and Asia or the peopling of the New World in prehistory. Studies of the migration process itself include correlations of genetic patterns with language stocks and attempts to discern gender ratios in migrating populations. Third are studies of single populations, including prehistoric burials from Fremont and Oneota sites and the patterns of distribution in mitochondrial (mtDNA) and the Y-chromosome in a Hispanic population. Data are now available to use in other small scale projects, such as Navajo demographic history.1

DNA, the short form for deoxyribonucleic acid, is a complex assortment of chemicals which controls genetic heredity in life on earth. Most of the DNA in cells is found in the nucleus. In sexual reproduction the nuclear chromosomes form pairs, sometimes exchange segments and recombine with chromosomes from the opposite parent, ensuring that each offspring has a unique genetic heritage, half of the new organism’s DNA coming from each parent.

In addition, organelles called mitochondria exist outside the nucleus, but contain additional DNA. This mitochondrial DNA is inherited only from the female parent, but is passed on to both male and female offspring. I should add here that one chromosome, the Y-chromosome, among those in the nucleus, contains DNA that is inherited only from the male parent and is passed on only to male offspring.

DNA carries a chemical code that controls the development of the organism. It can change, or mutate, however, and these mutations, if not of a lethal nature, accumulate in the DNA and can alter the code, and consequently the characteristics, of succeeding generations. Over a very long time span, these mutations lead to the origin of new species, but lesser degrees of change, presumably at a fairly constant rate, are also of interest.

The study of the sequences of the four basic chemicals which make up the genetic code has progressed rapidly in recent decades. It is now possible to map these sequences and identify differences between individuals, families, and larger populations with great precision. One application of this technique that has been well publicized is its use in law enforcement to determine whether a particular individual has committed a crime on the basis of a comparison of his or her DNA with DNA in blood, hair, skin or semen associated with an infraction, usually one of a violent nature. DNA can also be used to identify kinship, as in the case of paternity suits and the recent tests to establish who might be descended from Thomas Jefferson. Less well known is the study of the distributions of DNA characteristics among ethnic, national, racial and tribal populations to assess relationships that shed light on the histories of these groups.
Studies of American Indian DNA have led to new ideas relating to the peopling of the New World, as well as to interethnic relationships of the past. Most of this effort has been directed toward the major problems of migration. Those engaged in this research worked first primarily with mitochondrial (mt) DNA, which is thought to have a somewhat higher rate of change than nuclear DNA and thus to be more sensitive to events within the past several millennia. More recently research with Y-chromosome DNA and with nuclear DNA generally has expanded knowledge of tribal ancestries. In all cases, the number of individuals included relative to the overall tribal, ethnic or linguistic populations has been quite small. Compensating for this has been the use of samples from a great many tribes, these helping to average out sampling biases that might skew results.2

The lack of good random samples of a truly significant size must be kept in mind when considering the conclusions of these studies, for such factors as founder effect, genetic drift and adaptive change may well contribute to the results.3 Two particularly important factors, genetic mixture among differing peoples and social customs that would channel the patterns resulting from such mixture, seem to have received even less attention, although a few investigations of the effects of intermating have been done with interesting results.

Comparisons of mitochondrial and Y-chromosome DNA patterns suggest that small scale movements of women across ethnic boundaries are, or were, more frequent than similar movements of men, while longer migrations leading to genetic mixture are more characteristic of men. These studies have been made in Old World populations and have not been replicated in the Americas, nor have the exceptions that appear yet been given any attention. Still, the implications for interpretation of data thus far considered only in terms of group movements are worth considering.

Most attempts to characterize the migration of humans into the New World have relied on data from mtDNA. Different researchers have obtained somewhat differing data and several very different hypothetical descriptions of that migration have resulted, ranging from a postulated single migration to various numbers of waves of migrants and over varying periods of time. I feel that much of this lack of agreement lies in inadequate sampling and a still rudimentary understanding of all the variables involved, including a tendency to ignore social phenomena such as genetic mixing, differential gender effects and the perhaps more subtle influences of clan structure, residential customs, and settlement patterns. Most of the work was done prior to studies such as those of the male and female migratory patterns, however, and these may be taken into account in the future.

I will not get into these more global disputes here as I wish to concentrate on matters of more local interest, especially with regard to the Navajo past.

Geneticists have identified four major mtDNA founding lineages or haplogroups among the initial immigrants to the New World. These have been labeled A, B, C and D for ease of reference (Table 1). A few minor lineages will not be considered here, being so rare that in the small samples thus far available their significance is quite uncertain. The haplogroups can be further divided into haplotypes, but as few of the studies thus far reported distinguish haplotype distributions, they will also be omitted in what follows.

The ancestral home of the Athabaskan languages spoken by the Navajos and their Apache cousins was among the Northern Athabaskans of western Canada and interior Alaska. The Athabaskan peoples of the north, along with some neighboring coastal groups such as the Haida, Tlingit and Eyak on the west and the Eskimos or Inuit to the north have a very distinctive pattern in their mtDNA (Figure 1).
The A haplogroup is by far dominant among all these peoples. West of the Bering Straight in Siberia only the Siberian Eskimo and the Chukchi have a similar pattern. The prevalence of A reaches 100% in some studies of Northern Athabaskan groups. Haplogroup B is extremely rare, showing up only in trace amounts among the Inuit. Among the Na-Dene, both Northern Athabaskans and coastal peoples, C and D occur in variable proportions, usually small, but up to 40% in one Eskimo population (Kolmer et al. 1996; Lorenz and Smith 1994; 1996; Starikovskaya et al. 1998; Stone 1998; Stone and Stoneking 1998; Torroni et al. 1992).

In the Southwest there is a marked reversal of proportions of A and B. Among the prehistoric Fremont and the modern Tanoans (a mixed sample from Tiwa, Tewa, and Towa pueblos) A is lacking entirely, while B is present at 65% to 85%. At Zuni A rises to 18%, but B reaches 55% to 64%. C and D are minor constituents in all three populations (Lorenz and Smith 1994, 1996; Parr et al. 1996).

The Southern Athabaskans exhibit an intermediate pattern. Studies of Apaches, none of which specify tribal affiliation, have relatively high percentages of A, ranging from 52% to 64%. B is present, but only at 16% to 17%, with small representation of C and D.

Navajo studies exhibit a stronger shift toward the Fremont/Pueblo pattern. While A remains fairly high, 52%-61%, B goes up to 38-41%. Little C and no D have been reported, but this may be due to sampling bias in view of the very low percentages of both in most studies of tribes in this area. C does not ascend to significant proportions until the southern Southwest is included, reaching 38-43% among the Piman and Yuman speakers. D is present at up to 44% among the Paiute/Shoshone, where C occurs at 22%, but this is based on such a small sample that figures should not be considered reliable.
The relative proportions of A and B in these populations do appear to be significant. The Apachean peoples, while having a strong indication of their northern origin in the high proportions of haplogroup A, also demonstrate definite admixtures with older Southwestern populations, this being most pronounced in the Navajo percentages. As the genetic inheritance indicated comes only through the female line, the Navajo pattern is well in accordance with Navajo traditions of clan origins, which tell of a high proportion of clans descended from Puebloan women. (Kolmer et al. 1996; Lorenz and Smith 1994, 1996; Starikovskaya et al. 1988; Stone and Stoneking 1998; Torroni et al. 1992.

I have found only one study of y-chromosome haplotype distributions that includes Northern Athabaskans, Pueblos and Navajos. It contrasts two alleles, IT and IC at the DYS199 locus, for these populations. One Northern Athabaskan tribe, the Tanana, represented by only 12 individuals, had a split of 42% IT and 58% IC. The Navajo sample, of 55 individuals, had 49.1% IT and 50.9% IC, while an 18 person Pueblo sample had an even 50-50 split. Only the Navajo sample is large enough to be at all significant and the results must be regarded as inconclusive (Karafet et al. 1997).

There has been one quite detailed study of nuclear DNA among Southwestern tribes, performed by Francine Romero (1998) for her doctoral dissertation at the University of New Mexico. It is especially concerned with the Southern Athabaskans, comparing them with one Northern Athabaskan tribe, two New Mexico pueblos, a Plains tribe, and one Swedish community in order to control for European traits.

The Northern Athabaskan sample was made up of 25 individuals, all of whom were Tanana. The

<table>
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<th>Table 1</th>
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Range of percentages of haplogroups in the various populations from the sources consulted (Carlyle et al. 2000; Kolman et al. 1996; Lorenz and Smith 1994, 1996; Parr et al. 1996; Starikovskaya et al. 1998; Stone and Stoneking 1998; Torroni et al. 1992). The Anasazi percentages were not available at the time the original paper was written, but have been included so as to show the similarity between the Anasazi and Zuni contrasted with the similarity of the Fremont to the Tanoan.

<table>
<thead>
<tr>
<th>Populations</th>
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<th>B</th>
<th>C</th>
<th>D</th>
<th>Other</th>
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<td>Eskimo</td>
<td>25.0 - 96.6</td>
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<td>Na-Deme (Haida)</td>
<td>88.0</td>
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<td>No. Athabaskan</td>
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<td>Apache</td>
<td>64.0</td>
<td>16.0</td>
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<td>Navajo</td>
<td>51.9 - 60.9</td>
<td>37.5 - 41.4</td>
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<td>73.0</td>
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<td>0</td>
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<tr>
<td>Tanoan</td>
<td>0</td>
<td>86.1</td>
<td>2.8</td>
<td>2.8</td>
<td>8.3</td>
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</table>
Navajo sample is the largest, but is dominated by the three outlying Navajo communities which are treated as separate populations from the main Navajo sample, the members being Alamo - 30, Cañoncito - 29, Ramah - 36, other Navajo - 77. Two Apache groups are represented, Jicarilla - 32 and Mescalero - 34. This last is apparently drawn from the general population of the Mescalero Reservation with no distinction made among Mescalero, Chiricahua and Lipan tribal affiliation.

There is one Keres pueblo with 35 individuals represented and one Northern Tiwa pueblo with 32. The smallish sample sizes, aside from Navajo, are compensated to some degree by the number of populations represented.

The study details the distribution of alleles at 21 loci on 7 chromosomes, providing a generous quantity of data. I have charted all of these data on graphs, a separate graph for each locus, and find that the distributions, even for loci on the same chromosome, differ significantly.

Of the 21 loci utilized in Romero's study, 14 show easily identifiable tendencies in affiliation, the remaining 7 exhibiting so little variation or such diverse variety that they cannot be easily characterized in terms of interrelationships. Of those that can be so characterized, the Navajos align best with the Puebloans in 6 instances, with the Alaskan Athabaskans in 3 and with the Apacheans as a distinct entity in 5 (Figure 2).

One interesting feature is that certain groups sometimes, but not often, appear to have distinct configurations relative to all others at certain loci. This phenomenon appears only in Apachean populations and is most common for the outlying Navajo communities, all of which exhibit anomalous patterns twice, while the main Navajo and Jicarilla populations show only one instance each. For the outliers, founder effect or some other historical circumstance seems the most likely explanation. In the Navajo and Jicarilla cases, sampling bias seems more likely.

Romero's own analysis is a much more complicated statistical procedure to compare the genetic data with hierarchical tree diagrams based on a priori population models derived from culture areas, long range migration, geographic regions and linguistic affiliations. Her conclusions are much the same as mine, that close matching of genetic data with cultural or other factors is disrupted due to "a complex web of mate exchanges between southwestern Native American populations."

It is unfortunate that there are not more pueblos represented in this study, for that might aid in discriminating extraneous factors. The lack of data on the Navajo communities represented in the main Navajo population is an obstacle to better evaluation of its significance in relation to the

![Figure 2](image-url)

*Numbers of STD loci for nuclear DNA alleles in Navajo populations showing closest affinity with Alaskan Athabaskan, Apachean and Puebloan patterns. The indeterminate category includes both loci where there was great similarity among all populations and those with anomalous variation (based on data in Romero 1998).*
outlying communities. To compare the majority of the Navajo population on an equal basis with several small Navajo communities, whether out-
layers of itself or representatives of larger ethnolin-
guistic populations, as, for instance, a single Keres 
pueblo, creates problems of scale. Each Navajo 
community within the larger Navajo population is in 
some ways demographically equivalent to a sin-
gle pueblo.

For the Navajos the lack of data on clan affilia-
tions also hinders a more detailed analysis. A 
great many Navajo clans descend from immigrant 
populations, including Apachean, Puebloan, 
Numic and Hispanic at a minimum. It should be 
noted that the population of many Navajo com-
munities is dominated by one or a few clans 
which, if of foreign origin, might strongly affect 
the genetic make-up of the community (Reichard 

A study of mtDNA correlated with Navajo clan 
membership might be a good test of clan tradi-
tions, but only if sample size were adequate. 
Although a clan might have a specific ethnic ori-
gin, captives usually acquired clan membership in 
ways not connected with their own ethnicity, but 
usually with the clan of their captor or master. 
Most captives were male, at least in historic times, 
so that their genes would not show up in mtDNA, 
but some few were female (Brugge 1985:135-39). 
In addition, founder effect might exert a strong 
influence, as clans seem often to have had only 
one or a few original members. There are also 
clans that merge diverse ethnicities, such as the 
Salt Clan.

There is one further genetic study of some interest 
in this regard. It is a comparison of mtDNA hap-
lotypes with blood antigen types controlled by 
nuclear DNA to assess not only the degree of 
Indian genetic admixture in the Anglo and 
Hispanic populations of the San Luis Valley in 
Colorado, but also the proportionate role of 
parental gender in this interhemispheric mixture. 
In the Anglo population the proportion of nuclear 
genes of Indian origin was 9.7%±1.9 and of the 
population having mtDNA of undoubted Indian 
origin 0.9%±0.68. In contrast, the figures for the 
Hispanic population were 33.15%±2.4 for nuclear 
genes and 85.11%±1.68 for people having Indian 
ancestry through the maternal line. The disparity 
between the two measurements is thought to indi-
cate more Spanish men mating with Indian 
women than Spanish women mating with Indian 
men (Merriwether et al. 1997).

The percentages of Indian mtDNA haplotypes in 
the San Luis Valley study are A - 31%; B - 34%, C 
- 16%, D - 0.2%, other - 0.4%. These figures are 
most compatible with an assortment of tribes 
including Apachean, northern Uto-Aztecs and 
Puebloans, suggestive of there having been a sub-
stantial number of captive Indian women includ-
ed. Indian captives taken by Hispanics were most-
ly female by 50% to 60% (Brugge 1985:116).

In conclusion, DNA data can be very useful in the 
research of questions of local interest. Attention 
to historical, social, cultural, and political factors 
must be considered, however, for best results. Of 
greatest significance, perhaps, is the evidence 
favoring the hypothesis that the Navajos did 
receive substantial Pueblo refugee immigration 
during the long era of the Pueblo revolts and the 
Reconquest of 1692-1700, contrary to the claim 
that this did not happen (Hogan 1991) and sup-
porting the interpretation of dual origin for the 
Navajo Nation of Athabaskan-Apachean plus 
Anasazi-Puebloan (Brugge 1996:256-57).
ENDNOTES

1  This paper is a somewhat revised version of a paper read at the 1999 annual meeting of the Archaeological Society of New Mexico in Albuquerque. References to newer data are provided in the endnotes. As an anthropologist, I must apologize to the geneticists for any errors in the use of their data. My thanks to Lauren Rimbert for word processing.

2  Since this paper was written, several studies focusing on more discreet local problems have appeared. An especially good example is a test of the Numic expansion question by Kaestle and Smith (2001), as are the other reports cited below.

3  Kaestle and Smith (2001:2, 7, 10) find indications that genetic drift has not been an important factor in their study of population changes in the Great Basin. They also identify haplogroup x as a founder lineage and discuss its distribution (Kaestle and Smith 2001:9-10). Carlyle et al. (2000:97), however, believe that they have evidence of genetic drift in their data.

4  Carlyle et al. (2000:96) interpret their data as indicative of matrilineal descent of a significant proportion of Navajo ancestry from older Southwestern populations. Smith et al. (1999:274-276, 281) suggest that a very few examples of haplogroup x among the Navajos might indicate specifically Anasazi-Pueblo admixture, most probably from a Tanoan source. Mixtures of Navajo and Hopi have also been suggested by a comparison of combined mtDNA and nuclear DNA (Albumin Naskapi and Albumin Mexico) in modern populations (Smith et al. 2000:567).

5  Copies of my analysis of this data will be provided upon request.

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Tecolote Pueblo is the easternmost excavated Ancestral Pueblo site of its size. It occupies about 12 acres immediately south of the first terrace bank of the Tecolote River, about twenty miles north-northwest of the river's confluence with the Pecos River (Mishler and McPherson 1998). The site, northeast of Pecos and Rowe Pueblos, is located near the historic village of Tecolote approximately 10 miles south of Las Vegas, New Mexico. The present day site consists of eight mounds, several of which have been partially eroded by the Tecolote River.

Research conducted on prehistoric settlement patterns in northeastern New Mexico and the eastern border area of the Anasazi demonstrates a lack of large-scale systematic surveys, site excavations, and published information for this region (Cabebe 2002; Spielmann 1996). Although Tecolote Pueblo has an extensive history of archaeological investigation, little information has been available to the public.

HISTORY OF INVESTIGATIONS

The first known recorded visit to the site was on June 19, 1917 by the Andover-Pecos Expedition (Unknown 1917). Members of the expedition visited large Native American sites in the Upper Pecos area and excavated portions of Pecos Pueblo and Rowe Pueblo at that time. An expedition report, possibly written by Alfred V. Kidder and/or Carl Guthe, described the ruins at Tecolote as portions of walls, exposed for a distance of about 130 yards, visible in a 30-foot high bank cut by the Tecolote River. The report also noted that the arrangement of nine mounds suggested three courtyards and that the surface was scattered with reddish sandstone building stones, possibly quarried nearby.

Evidently A.V. Kidder was aware of the ruins early on, judging from his subsequent excavation of the site in 1929. While working at Pecos Pueblo, Kidder sent three field students, Isabel Kelly, Francis Watkins, and Eva Horner to the Tecolote site to conduct a four week excavation (Figure 1). Kidder paid weekly supervisory visits to the site, bringing along various visitors, includ-
The 1929 excavation was limited to features in two mounds, a primary habitation mound along the terrace edge, currently Mound A, and a large mound to the east, now designated Mound B. Excavations in Mound A included a possible subterranean kiva within a suspected plaza area and the remaining portion of a stone and mud mortar masonry surface room block built over an earlier masonry surface room (Figure 2). Several of the rooms had flagstone floors similar to those found at Forked Lightning Ruin (Kidder 1958), Paa-ko (Lambert 1954) and at Pecos Pueblo (Kidder 1926). In Mound B a series of adobe-walled contiguous surface rooms, also built over earlier rooms, was excavated and recorded. A dendrochronologic cutting date of A.D. 1171 was obtained from one of the upper rooms (Robinson, Harrill and Warren 1973; Stallings 1932, 1933; Kelly, Watkins and Horner 1929). Complete results of this excavation are contained in a comprehensive set of field notes and diary kept by the three women and housed at the Harvard Peabody Museum. Copies are on file at the Anthropology Lab, New Mexico Highlands University (NMHU). Kidder donated artifacts and the eleven human burials obtained at the site to the Peabody Museum in 1958. Thirteen photographs from the 1929 excavation have been identified in the Tecolote file at the Laboratory of Anthropology/ARMS archive, Santa Fe (Cabebe 2002).

During the next two years (1930-1931), W.C. Holden of Texas Technological College (now Texas Tech of Lubbock) excavated at Tecolote Pueblo. Excavations were again limited to Mound A and the depression between Mounds A and B. A circular stone masonry surface room (just east of the 1929 masonry rooms) was excavated on Mound A (Holden's Room d). Three meters of cultural material and two burials were excavated below the floor of Room d the following year. A cross-trench was dug at the crest of Mound A, which intersected a long, possibly external, masonry wall. The wall extended north to the terrace edge and had a branch that ran east and southeast (Holden 1930, 1931a).

Also excavated by Holden in 1931 was a 9 m diameter subterranean kiva located in the low area between Mounds A and B (Holden 1931b, 1932). The remaining subsurface walls (approximately 92.3 cm in height) and floor were plastered, including the large 77 cm inner diameter superfloor hearth constructed of 25.6 cm thick fire-hardened adobe walls (nicknamed "the bathtub" by Holden's crew). The hearth's depth reached 30.8 cm with approximately 15.4 cm below floor level. Southeast of the hearth, three large, flat stones were set on edge in the floor so as to form a line. Two burials were located within this room's fill. These two excavation field...
Seasons resulted in a 7,761 artifact count and 10 burials involving 17 individuals. All are now curated by the Museum of Texas Tech University.

The following year, Marjorie Ferguson Lambert conducted a large field school excavation at the site, in conjunction with the Normal University (now NMHU) and the University of New Mexico. In addition to the 36 field school students, seven Tesuque and San Ildefonso Native Americans were employed at the site (Figure 3).

Altogether, 15 masonry surface rooms, one masonry kiva 9 m in diameter (Figure 4), one partial masonry kiva, 12 or 13 human burials, and numerous artifacts were unearthed (Ferguson 1932, 1933). The south end of a long external north-south masonry wall joined the outer west wall of the complete kiva. This may have been the same wall initially excavated by Holden, which extended further south to the kiva reported by Lambert.

Unfortunately, the 1932 field notes, site maps, burials, and some of the excavated artifacts have not yet been located. The only artifacts found to date include: (1) several complete ceramic vessels and one partial pitcher donated to the Museum of Indian Arts and Culture, Santa Fe (Cabebe 2002); (2) ten bags of ceramic sherds in the H.P. Mera collection at the Laboratory of Anthropology (Fugate 1995); and (3) a few worked bones and ceramic sherds housed in the Anthropology Laboratory at NMHU.

The surface masonry architecture excavated by Lambert's crew (and previous investigators) was covered in soil and not apparent on the surface prior to excavation (except where noted in the eroded river bank). Backdirt and rocks (from previous diggings, as well as their own) were dumped over the terrace edge into the Tecolote River (Figure 5). Forty-two photographs documenting the 1932
excavation, crew, architecture, and some of the
burials from the Tecolote site have been identified
at the Laboratory of Anthropology/ARMS archives
(Cabebe 2002). Four dendrochronology end dates
(the outer rings missing), ranging from A.D. 1200
to 1259, were obtained from these masonry rooms
and a partial kiva excavated by Lambert (Robinson,
The site was not excavated again until the late
fifties and sixties by instructors at NMHU.

NMHU history professor Floyd W. Snyder and
anthropology/sociology professor R. Lee McNair
conducted several archaeological field schools at
Tecolote between 1958 and 1968. Most of the stu­
dent field notes and records are on file at NMHU's
Anthropology Laboratory, but they are inadequate
for evaluation of the architecture excavated.

NMHU anthropology professor Robert E. Mishler
is the site's current principal investigator and has
conducted field schools there intermittently since
1970. Investigations in Mound A have revealed a
possible borrow pit and a partially eroded, circu­
lar, adobe-walled surface room (Figure 6).
Archaeomagnetic dates obtained from the floor
hearth in the adobe surface room gave a peak fir­
ing range of A.D. 1050-1175 (Eighmy 1996).

DISCUSSION

Architecture

Tecolote Pueblo appears to have been a
continuously inhabited site marked by
several building phases, multiple remodel­
ing sequences, and intermittent periods
of temporary intrasite abandonment or
disuse. It was determined through analy­
sis of the excavation records and photo­
graphs that two phases of architectural
construction may have occurred at the
site: (1) subterranean and surface adobe­
walled architecture (A.D. 1050-1200);
and (2) surface stone masonry-walled
architecture (A.D. 1200-1300).

The last peak firing date (A.D. 1050-1175) of the
hearth in the adobe surface room on Mound A
excavated by Mishler indicates that this room
may have been abandoned when the uppermost
adobe roomblock on Mound B (Kelly et. al.1929)
corresponds to a date around A.D. 1171. The
kiva hearth found in the lowest level of the rooms
in Mound B was possibly contemporary with the
adobe surface room on Mound A, and both may
represent an earlier, smaller, more dispersed occu­
pation of the site.

Construction of the upper level adobe
roomblock, excavated by F. Watkins on Mound
B, may have signified a small initial aggregation
at the site around A.D. 1100. Several hearths
and no storage features are associated with these
rooms. All of these rooms had several prepared
adobe floors representing remodeling episodes.
Minimal fill separated each floor from the next.
These are readily discernible from periods of tem­
porary room abandonment, which accumulated
greater depths of cultural fill and were often
accompanied by lenses of natural sediment
between floor surfaces.
Judging from photographs of the architecture excavated by Ferguson (1932) and Kelly, Watkins and Horner (1929), it is likely that the well-documented masonry room block excavated by Kelly, et al. and the circular masonry surface room and long external wall excavated by Holden (1930, 1931a) were contemporary with the rooms and kivas excavated by Ferguson (1932). Photographs of Ferguson’s exterior wall, located adjacent to several rooms and connected to Kiva I (Figure 7), indicate that it is similar to the external wall excavated and described by Holden (1932).

The contiguous masonry rooms lacked interior hearths. There were, however, two interior storage features (a flagstone-lined storage bin and a small storage pit) that suggest a greater commitment to food storage and perhaps crop cultivation than the earlier adobe rooms (Figure 8). No evidence has been found for multiple stories at Tecolote Pueblo. Thus despite the apparent absence of interior hearths, the masonry rooms at Tecolote Pueblo probably served as living spaces rather than as the ground floor storage rooms evident at multiple-storied pueblos.

Environment and Subsistence

Examination of environmental data suggests that Tecolote Pueblo was situated in a spatially heterogeneous natural environment near a perennial water source. Today, grass cover in the Tecolote area is less than 50%, tree cover is less than 10%. The overstory is primarily juniper (Juniperus sp.) and pinon (Pinus edulis), with prairie grasses and cholla (Opuntia

A second, and perhaps principal, building phase of masonry surface room blocks occurred at the site sometime after A.D. 1200. This estimation is based on dendrochronology end dates from Ferguson’s (1932) excavated architecture that ranged in dates from A.D. 1203 to 1259 (Robinson, Harrill and Warren 1973; Stallings 1932).
imbricata) below (Misher, McPherson and Cabebe 2002). A preliminary archaeological study of carbonized floral remains (Cabebe 1999) has identified melon (Cucurbitaceae sp.), pigweed (Amaranthus sp.), goosefoot/lambs quarter (Chenopodium sp.), prickly pear (Opuntia polycantha), bean (Phaseolus vulgaris and Robinia sp.), piñon (Pinus edulis), purslane (Portulaca sp.), chokecherry (Prunus sp.), drop seed (Sporobolus sp.), and juniper twigs and scales (Juniperus sp.). Archaeological evidence of cultivation includes carbonized corn (Zea mays) 5-7 cm in length, and possibly beans, melons, and squash. The botanical identifications in this study have yet to be confirmed by a professional ethnobotanist.

Primary wild fauna in the region today include deer, elk, coyote, rabbits, prairie dogs, mice, rattlesnakes, non-venomous snakes, wild turkey, red-tailed hawk, various owls, and other birds. Fauna identified in the archaeological record are Artiodactyla spp., including deer, elk (?), pronghorn antelope, and mountain sheep or goats, accounting for approximately 80% of the identifiable mammal bone. Also common are lagomorphs (jack rabbit and cottontail rabbit), followed by rodent species such as squirrels, gophers and prairie dogs. Low numbers of carnivores or omnivores such as coyote, bobcat, and skunk occur, as do birds (turkey, hawk, owl, grouse, etc.) (Brock 1994; Townsend 1986).

The Tecolote River originates 22 miles north-northwest of the pueblo in Johnson Mesa. The river usually runs year-round and is subject to flooding and seasonal run-off each spring (mountain snowmelt) and late summer (monsoon rains). Past changes in the river's course are likely reasons for loss, approaching 50%, of three riverfront cultural mounds (Mishler, McPherson and Cabebe 2002).

**Aggregation and Its Causes**

Most evidence to date indicates that Tecolote Pueblo is an Ancestral Puebloan site. In terms of recognized Ancestral Puebloan culture periods, the Tecolote Site is either Pueblo III (A.D. 1100-1300) in the Pecos classification system (Kidder 1927) or late Developmental (A.D. 600-1200)/early Coalition (A.D. 1200-1325) in the Northern Rio Grande classification system (Wendorf and Reed 1955). Tecolote perhaps better fits the Northern Rio Grande cultural nomenclature. However, neither the Pecos nor the Northern Rio Grande classification system specifically addresses extreme eastern Ancestral Puebloan adaptations, as manifested by Tecolote Pueblo and other sites (Cordell 1998:78; Stuart and Gauthier 1981).

Prior to the pueblo's establishment, the area was occupied by smaller dispersed settlements of pit structures representative of both Plains-Panhandle and early Developmental cultures. Tecolote Site occupation before A.D. 1000 is conjectured from radiocarbon dates from a Mound E trash midden (A.D. 712±13 and A.D. 923±11). It is hypothesized, based on low amounts of early ceramic types (e.g., Red Mesa...
Black-on-white pottery) and pit features, that the earliest occupation was small relative to the later, overlying pueblos that represent population aggregation at the site. Pithouse architecture is characteristic of the early Developmental period at sites such as Pecos (Nordby and Creutz 1982), Cimarron, and the Rio Grande sites east of Albuquerque (Cordell and Gumerman 1989:304-05).

In the late Development period small rectangular masonry surface roomblocks or pueblos are reported in Santa Fe Valley (Cordell 1979), Galisteo Basin (Lange 1977), middle Pecos Valley (Jelinek 1967), and farther east on the plains (Stuart and Gauthier 1981). This appears to be a time of expansion of Pueblo culture east of the Rio Grande region into the drainage systems of the Pecos, Tecolote (Tecolote Pueblo), Gallinas (Mishler 1998), and Mora (Lister 1948) rivers, and as far east as the Canadian River (Cordell 1997; Wendorf and Reed 1955).

Abandonment of nearby smaller, dispersed sites such as Sitio Creston around A.D. 1100 (Wiseman 1975) may have led to aggregated settlements in the area, which are represented by early (A.D. 1100-1150) pit and above-ground adobe architecture at Tecolote Pueblo and the nearby Tinsley site (Kelly, Watkins and Horner 1929; Mishler 1998).

This initial aggregation may have been a response to environmental and demographic stress. Using precipitation data by J. S. Dean (1988; 1996) and Steven LeBlanc's (1999) summary of violence in the Southwest, Stephen LeKson (2002) evaluates the Ember and Ember (1992) model on the causes of warfare, namely resource unpredictability (external factor) and fear-induced socialization (internal factor).

Leckson plots Ember and Ember's "resource unpredictability" for Dean's "high temporal variability" (spans of year-to-year variations in tree-rings that changed rapidly in a shorter period of 1-10 years) and "resource predictability" for Dean's "low temporal variability" (changes in tree-rings that took place more slowly, probably over several decades) and compares it to LeBlanc's sequence of feuding, raiding, peace and warfare in the Southwest with some interesting results. Tecolote Pueblo's initial aggregation (A.D. 1000) appears at the end of Leckson's second period of resource unpredictability (A.D. 750-1000) and during a relatively peaceful period punctuated by "EP" (extreme processing) events. These "EP" events involved ritualistic or ceremonial mutilations and killings purported by Leckson to be a form of social control emanating from regional centers. Aggregation at this time, quite possibly, was a response to both resource unpredictability (external factors) and fear-induced socialization (internal factors).

A second (possibly principal) aggregation period, represented by the above-ground masonry architecture, may have taken place at Tecolote around or perhaps slightly later than A.D. 1200. Environmental conditions did not appear to be a major factor during that time, but the preceding 50+ years were significant for periods of low annual rainfall in the Arroyo Hondo/Santa Fe area (Rose, Dean and Robinson 1981). LeKson (2002) describes the period A.D. 1000 to 1250 as a time of resource predictability and peace (marked by "EP events").

A.D. 1250 to 1560 was another period of resource unpredictability and the onset of "village-on-village and alliance-on-alliance warfare" (LeKson 2002:616). Aggregation at this time (from an immigration of smaller dispersed sites) would have given the Tecolote community an advantage over exploitable territory and the options provided through exchange.

Ceramics, Trade and Regional Affiliations

Evidence of exchange or trade often indicates affiliations between different groups. Advantages may appear in the form of exchanged goods to offset shortages, associations for spousal arrangements, territorial agreements, and ceremonial
connections. Social or trade affiliations are sometimes assumed from the presence of non-local pottery types.

The concentration of site dates (A.D. 1050-1300) indicate that Tecolote Pueblo existed during the late Developmental (A.D. 600-1200) and early Coalition (A.D. 1200-1325) periods. All of the ceramic types identified at Tecolote Pueblo are associated with these time periods in the upper Rio Grande, Santa Fe, and Upper Pecos Valley regions. Santa Fe Black-on-White, Galisteo Black-on-White, and Wiyo Black-on-White belong to the Pajarito White Ware tradition and indicate interaction within the Upper Pecos and Santa Fe regions. Non-local ceramics include St. John’s Polychrome, Tularosa Black-on-white, Chaco-McElmo Black-on-white, and Chupadero Black-on-white indicate interaction with people outside the region.

The majority of early intrusive wares identified at the Tecolote site are pre A.D. 1200. They appear to represent an occupation date range of approximately A.D. 875-1275 and coincide with dates obtained for the adobe architecture. Depending on the reliability of identifications, these ceramics may indicate an early (initial) occupation of the Tecolote site by people from the San Juan Basin. An alternative explanation is that the initial occupation at Tecolote Pueblo (A.D. 1050-1200) was a local population affiliated with the San Juan Basin. Associations then later shifted to the upper Rio Grande with the emergence of trade centers there around A.D. 1200, coinciding with a principal aggregation at the Tecolote site.

Prevalent black-on-white and utility wares found at Tecolote are comparable to ceramics found at other regional aggregated sites (Forked Lightning, Rowe, and early Pecos) in the Upper Pecos Valley. The chronological sequence of predominately Santa Fe Black-on-white and Galisteo Black-on-white, and lesser amounts of Tularosa Black-on-white are consistent with population aggregation for those regions. These later ceramics offer a date range of A.D. 1125-1375 and correspond to the site’s principal aggregation period, characterized by masonry architecture.

The ceramics at Tecolote evidence consistent social or trade alliances with regions to the west, and obsidian and shell items found at Tecolote were likely obtained through these or similar associations. The small amount of cord-impressed ceramics (Zaia 1999) and non-local cherts (Patterson 1996) identified at the site suggest a lesser degree of Plains influence or contact at the site. Given its location and proximity to Plains village sites, it is somewhat surprising that so little Plains influence has thus far been found at Tecolote Pueblo. One explanation for this, suggested by Susan Vehik in Conflict, Trade, and Political Development on the Southern Plains is that “...there was little trade taking place in the area under consideration before A.D. 1250. What little trade occurred emphasized connections with other Plains areas.” (Vehik 2002:51).

Essentially, the sociopolitical situation on the Plains did not necessitate extensive trade. Even when the situation changed (increased conflict) between A.D. 1250 and 1450, Vehik maintains that “Nonlocal materials most commonly came from other Plains Village tradition members, but most complexes also maintained connections with groups outside the Plains...Those people further west had stronger connections to the Southwest.” (Vehik 2002:51). The timing suggests that what little trade may have occurred between Tecolote Pueblo and the Plains was not extensive and probably occurred shortly before the Pueblo was abandoned.
CONCLUSION

There are architectural and other similarities between Tecolote Pueblo and Rowe Pueblo. Particularly notable are the two phases of construction found at both sites. Both are characterized by earlier adobe pits and surface dwellings and later masonry surface roomblocks. These phases are interpreted as expressions of change in Upper Pecos Valley building practices between the late Developmental (adobe) and Coalition (masonry) periods (Cabebe 2002, Ch. 5; Cordell 1998:27-46, 52-58). This change may be one manifestation of coalescence and population increase at both sites (Cabebe 2002, Ch. 11; Cordell 1998:87-89). Change from adobe to masonry construction can also be seen at Dick’s Ruin and Forked Lightening (Kidder 1958), and further south at Paa-ko (Lambert 1954).

The Tecolote Pueblo occupation date range obtained from analysis of dated architecture (A.D. 1050-1300) and ceramics (A.D. 875-1275) is early for the coalescence phase in the Upper Pecos Valley region and somewhat earlier than Rowe Pueblo (A.D. 1250-1425) and other large Coalition sites. The timing of Tecolote abandonment (around A.D. 1300) coincided with a general decline in smaller aggregated sites throughout the Middle and Northern Rio Grande and Upper Pecos valleys, the emergence of larger coalescence sites to the west and north, and increased conflict throughout the Southwest (Lekson 2002).

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Prior to the work of the Rainbow Bridge-Monument Valley Expedition (RBMVE) in the 1930s, the term archaeological survey is not appropriate for work done in the canyon. Most of the major sites and some of the smaller sites in the canyon were visited by archaeologists such as Richard Wetherill, John Wetherill, Byron Cummings, and Samuel Guernsey, but there was never any real attempt to cover the canyon or document what was found systematically.

When Lyndon Hargrave arrived at Marsh Pass in the summer of 1933 to take charge of the field operation of the RBMVE, he found a group in need of direction. He chose to focus mapping, biological research, and archaeological work on Tsegi Canyon (Christenson 1983:14-15). The first two years included work on cliffdwellings (Twin Caves; Len-a Ki), a burial site (Woodchuck Cave), and open sites in Dowozhiebito (Dogoszhi Biko) and it does appear that there was an attempt to cover an area systematically. Of particular importance is that Hargrave, who had a strong interest in ceramics, instructed crews to collect a representative sample of sherds from each site, meaning at least one example of each type present (Hargrave 1935:24). His work on the RBMVE ceramics led to the naming of many basic types still used today (e.g., Dogoszhi B/W, Sosi B/W, Kiet Siel Gray, etc.).

Systematic survey of large areas of the main canyon began in 1935 and continued until the end of the project in 1938. Generally this work was under the direction of Ralph Beals, although Benjamin Wetherill, E. T. Hall, Jr., George Brainerd, and Watson Smith played important roles in archaeological decision-making (Christenson 1983:15-16). Brainerd’s involvement was particularly important because his interest in ceramic seriation required not simply the collection of one example of each type from a site, but of a statistically representative sample from which the proportion of types could be estimated (Beals et al. 1945:13-14). Brainerd appears to have originated the use of the strip graph to seriate the Tsegi pottery collections, a method archaeologists tend to associate with James A. Ford (O’Brien and Lyman 1998:198).1

Significant archaeological work of any kind in the canyon was abandoned for a quarter of a century. Jeffrey Dean’s dissertation research returned to more canyon-wide interests and focused upon the dendrochronology of Tsegi Phase cliffdwellings (Dean 1969). Another quarter century went by before Jonathan Haas came to the canyon with an interest in evidence for warfare in the Kayenta region. Crews under Haas systematically examined all rock shelters in Dowozhiebito, Long, Kiet Siel, and Bubbling Springs canyons. Open sites were noted when encountered, but were not specifically sought out. An important aspect of Haas’s survey was that rockshelters were recorded regardless of whether they had evidence of occupation or not, providing a unique database that allowed inferences about rockshelter use (Haas and Creamer 1993).
PROJECT GOALS

My initial interest in Tsegi Canyon came from being introduced as a student of Jim Hill to the many Southwest studies of prehistoric organization including Jeff Dean's dissertation study of the social organization of Betatakin and Kiet Siel. Later, as a graduate student, I was curator of the RBMVE collections at UCLA and so became intimately familiar with them even before Helen Crotty showed up one day with an interest in doing a project on the expedition’s ceramics from RB568, their largest non-Tsegi Canyon excavation. This event led to work on the history of the expedition (Christenson 1983, 1987) but also planted a seed of interest in Kayenta ceramics and archaeology. This seed developed with the Black Mesa Archaeological Project, in Carbondale working on Black Mesa stone tools and beginning to develop an absolute ceramic dating technique, and in Tucson, where I shared an office with Watson Smith, working on a history of Kayenta Anasazi archaeology (Christenson 1986). A major breakthrough occurred when I was invited to run one of Jonathan Haas’s field crews in Tsegi in 1987. This hands-on experience in the canyon led me to develop a project to resurvey the RBMVE sites in the canyon and see if additional data on dating could be obtained. I spent the following summer in Tsegi with a Navajo assistant revisiting RBMVE sites and exploring various areas of the canyon. Shorter visits to the canyon from 1988 until 1995, allowed me to expand somewhat beyond the RBMVE survey area as well as gather information on the microenvironment of Tsegi rockshelters (Christenson 1991) and to assist Ed Wright in coring beams in several sites for tree-ring dating (Wright 1990, 1997).

This paper briefly summarizes the results of my work in the canyon and provides some tentative observations on the Tsegi Canyon cultural sequence.

SURVEY METHODS AND RESULTS

Survey began in the areas that the RBMVE covered systematically from 1935 to 1938, which extended from Cobra Head Canyon on the east to lower Long Canyon on the north (Beals et al. 1945:Map 1). The map published in Beals and associates was detailed and the site cards, of which I carried photocopies, often had useful sketch maps, so it was a simple matter of moving through the canyon from site to site. In 1988, I had Leo Greyeyes, a local Navajo whose family ran cattle in the Canyon as an assistant and guide. His assistance was invaluable as he grew up at the mouth of the canyon and his family had a long association with the area (his great grandfather’s wife told John and Louisa Wetherill and Byron Cummings about the location of Betatakin).

Other than walking from known site to known site the survey technique was to examine the current floodplain benches (the location of the floodplain prior to arroyo cutting), sand dunes coming off the canyon walls, rockshelters in the canyon walls, and the Kayenta formation bench when accessible. In the main part of Tsegi the floodplain terrace can be quite wide, up to 1000 feet in some places, but it is more common to be one-tenth of that, so a stroll up the bench, keeping a lookout for rockshelters and buried sites in the sidewalls of arroyos, is as complete a survey of the canyon as is possible.

Once all of the RBMVE sites were located, I extended my survey to areas that the expedition did not work in, eventually covering a total of 17 km of the main canyon and 32+ km of side canyons (Figure 1). Calculation of total acreage surveyed is difficult but my guess is in the area of 1500 acres. Although we did not do systematic survey beyond what is show in Figure 1, I did make special trips to the ends of most of the principal branch canyons of Tsegi and visited most of the major cliffdwellings outside my survey area. In
only a couple of places did I examine small areas of the Shonto Plateau and Skeleton Mesa. Also, I generally did not extend my survey into areas that the 1986 Haas survey concentrated on – Dowozhiebito, Kiet Siel Canyon, and Bubbling Spring Canyon (Haas and Creamer 1993:Figures 5-3), although I did do a little work on one side of middle Kiet Siel Canyon (Figure 1).

Sites are dated with mean ceramic dating (mcd), a method developed in historical archaeology but adapted by me for the Kayenta region (Christenson 1994). The method allows assigning single year dates to sites as estimates of their mean date of occupation. The technique gives a 95% confidence interval of 75 years or less in the pre-1100 period and 15 years in the 1100 to 1300 period (Christenson 1994:307). Dates were considered to be multicomponent if their ceramic date had a standard deviation over 90 years in the pre-1100 period or over 45 years in the post-1100 period. Components of multicomponent sites were factored out using a regression technique developed by Kohler and Blinman (1987) so that some sites have two or three mean ceramic dates with a percentage of the assemblage associated with each.

In summary, I relocated and rerecorded 123 RBMVE sites and visited, but did not rerecord 19 more. There were 52 RBMVE sites that I did not revisit because of accessibility or other issues, 39 that I could not find, and two that were gone because of erosion. In addition, I recorded 122 sites that had not be recorded by the RBMVE, some of them in areas that the expedition never got to. The discussion below includes my sample of 245 sites as well as some of the RBMVE sites that I did not revisit but from which ceramic collections were available at UCLA or MNA. A total of 343 components is in the database that I use below.

BASIC TEMPORAL PATTERNS

Table 1 summarizes the basic site characteristics for seven time periods divided into open sites and rockshelter/cliffdwelling sites. These periods represent “natural” units in that they are defined by the presence or absence of certain material culture (pottery, written records, etc.) or there are breaks in the frequency distribution of dated sites. The salient characteristics of archaeological remains in these periods are reviewed below.

Figure 1
Map of Tsegi Canyon system showing area surveyed, canyon names, and geographic divisions (indicated by bars) used in this paper.
### Table 1
Site Characteristics by Time Period.

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Preceramic</th>
<th>700-948</th>
<th>953-999</th>
<th>1009-1064</th>
<th>1069-1122</th>
<th>1125-1193</th>
<th>1200-1279</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OPEN SITES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n (a)</td>
<td>15</td>
<td>36</td>
<td>30</td>
<td>15</td>
<td>46</td>
<td>44</td>
<td>23</td>
</tr>
<tr>
<td>Size Range (sq. m)</td>
<td>153-990</td>
<td>20-14400</td>
<td>196-7420</td>
<td>116-4002</td>
<td>33-6567</td>
<td>58-6767</td>
<td>119-15988</td>
</tr>
<tr>
<td>Size Mean</td>
<td>479</td>
<td>1450</td>
<td>1643</td>
<td>875</td>
<td>1215</td>
<td>1518</td>
<td>2155</td>
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<tr>
<td>n (d)</td>
<td>14</td>
<td>28</td>
<td>28</td>
<td>11</td>
<td>39</td>
<td>38</td>
<td>17</td>
</tr>
<tr>
<td>Hearth/ Dark Soil</td>
<td>8</td>
<td>17</td>
<td>14</td>
<td>5</td>
<td>18</td>
<td>13</td>
<td>6</td>
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<tr>
<td>Rock Art</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Cist</td>
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<td>4</td>
<td>2</td>
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<tr>
<td>Masonry Structure</td>
<td>15</td>
<td>10</td>
<td>2+1?</td>
<td>16</td>
<td>16</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Pit Structure</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1+1?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slab Structure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Depression</td>
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<td>Defensive Wall</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>ROCKSHELTERS/CLIFFDWELLINGS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n (a)</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>9</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>Size Range (sq. m)</td>
<td>338-480</td>
<td>351-1836</td>
<td>147-960</td>
<td>58-800</td>
<td>36-9450</td>
<td>36-4640</td>
<td></td>
</tr>
<tr>
<td>Size Mean</td>
<td>409</td>
<td>1093</td>
<td>798</td>
<td>429</td>
<td>1503</td>
<td>1927</td>
<td></td>
</tr>
<tr>
<td>n (d)</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>Rock Art</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masonry Structure</td>
<td>1</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Granary</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Circular Structure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

(a) includes multicomponent sites; multicomponent sites excluded from all other rows.
(b) rock art site excluded
(c) largest site excluded
(d) number of sites with feature data available

**Preceramic.** The RBMVE concentrated primarily on ceramic sites. Of the 15 preceramic or aceramic sites I recorded in the areas that the expedition surveyed only five had been recorded by the expedition. Although the "classic" Basketmaker II sites of Guernsey and Kidder are in rockshelters (e.g., White Dog Cave; Cave 1, Kinboko), only one of the sites I recorded as preceramic is so situated and it is rock art at a multicomponent site. All but one of the non-rock art sites in this sample are small (mean 22 x 22 m) open sites, often on sand dunes and usually consisting of dark soil with chipped stone, one-hand manos (6 of 13 sites), basin metates, and sandstone slabs. The largest of these sites consists of five or more burned soil/sandstone rubble areas separated by 8
to 24 m in sand hills. These areas could represent multiple visits to the same location or an encampment of multiple groups.

Although it is possible that one or two of these are Basketmaker III or Pueblo period aceramic sites, they have the “look” of earlier sites. Five of the sites have one or more pieces of white baked siltstone, a raw material found only on Black Mesa and used primarily in the pre-800 period (Parry 1987:25-26).

Late Basketmaker III-early PII (ca. 700-948).
Sites of this period are dated by the presence of plain grayware, Lino Gray, Lino B/G, and Kana-a B/W. Mean ceramic dating is generally possible only on the last third of this time range. Sites differ from ones of the preceding period by being about three times as large (38 x 38 m) and having evidence of masonry structures. The largest of these sites (not included in the mean above) is in Kiet Siel Canyon and has nine areas of artifacts, rubble, and dark soil in a 3.5 acre area along a sand ridge. Although evidence of pit structures or a depression is evident at a few of these sites, masonry remains represented by walls or, more commonly, rubble piles are the predominant architectural evidence. Slab cists are also common. Rockshelter use is limited to a granary and a rockshelter with three rooms.

Early Pueblo II (953-999). Sites of this period have Kana-a and Wepo B/W, Kana-a Gray, and San Juan Red Ware. Slightly increased size in both open and rockshelter sites is the primary difference from the previous period.

Pueblo II (1009-1064). Sites of this period have Wepo and Black Mesa B/W, mixtures of Kana-a Gray and Tusayan Corrugated, and mixtures of San Juan Red Ware and early Tsegi Orange Ware. Open sites are smallish (30 x 30 m) with limited evidence of structural remains or features. Rockshelter use increased a little and features include granaries and a couple of small rooms.

Late Pueblo II-Early Pueblo III (1069-1122). This period is characterized by sites with Black Mesa, Sosi, and Dogoszhi B/W, Tusayan Corrugated, and various Tsegi Orange Ware types. The period saw extensive use of much of the canyon system resulting in medium-sized open sites (35 x 35 m) that have evidence of masonry architecture. Rockshelters use tended to be limited to a few rooms or a granary except for NA 3142 (RB 315) in a tributary of Long Canyon that is a multicomponent cliffdwelling with a mean ceramic date of 1120 and tree-ring dates in the 1270s. Excavated by Byron Cummings in 1914, this site may have had as many as 45 rooms (Wright 1990:3), although fewer are visible now. About 50% of the ceramics at the site come from the early twelfth century component, but no specific rooms can be assigned to this component.

Middle-Pueblo III (1125-1193). Sites of this period have many of the same types as the previous period but with Moenkopi Corrugated beginning to replace Tusayan Corrugated and Flagstaff B/W beginning to replace the earlier whiteware types. Open sites in this period are 25% larger (39 x 39 m), but otherwise similar in most ways to the previous period. Rockshelter use, however, almost doubles (28% of sites) and average rockshelter size is larger than previous periods. Rockshelter use usually consists of 2 to 9 rooms and associated features along a fairly accessible cliff face (but see below).

The period of the 1180s to the 1230s was a down time in Tsegi with less than a dozen sites dating to a 60 year period. Northern Black Mesa was also abandoned by this time, so one wonders where the fairly substantial populations of the previous 60 years went. Of particular interest are the few sites that date to the last years of the twelfth century. Of the four sites dated between 1186 and 1199, one is a 14 room cliffdwellng with one entryway guarded by loopholes (mcd = 1186), one is a few rooms on a finger mesa with a wall blocking the access (mcd = 1191), one is a small site called Hostile House located on a rock against a cliff
with a double-thick loopholed wall on one end (mcd = 1191) (Dean 2002:141) (Figure 2), and the last is an open site (mcd = 1193). These first three sites appear to have the earliest clear defensive features in the canyon (there is at least one cliff dwelling in upper Long Canyon, Ladder House, occupied in the late tenth and mid-eleventh centuries that is defendable, though not necessarily defensive). That they occur at the transition between a period of high population and a near hiatus in occupation of the canyon may not be coincidental. Interestingly, current models of warfare in the Southwest place this period in one of “standard tribal level of warfare” (LeBlanc 1999:195) or in the Pax Chaco “era of peace” (Lekson 2002:614).

Late Pueblo III, Tsegi Phase (1200-1279). Except for a revival of Tusayan Corrugated at some sites and a lingering of Flagstaff B/W, the ceramic assemblages of this period consists of types such as Tusayan B/W, Kiet Siel Gray, and white-lined Tsegi Orange Ware polychrome that originated after 1200. Although the largest sites in this period are in defensible cliff dwellings or on mesa tops with difficult access, the largest number of sites are in the open, like those of earlier periods. Sites such as Betatakin (estimated population 125; Dean 1969:76), Wildcat Canyon Ruin (over 200 rooms; Haas and Creamer 1993:70), and Swallows Nest (estimated population 25-30; Dean 1969:158) held the bulk of the Tsegi phase inhabitants of the survey area, with smaller open sites being perhaps farmsteads or habitation sites. Because the two largest sites were not located next to agricultural areas, occupants had to either walk varying distances to get to their fields or had to have places to stay overnight or longer near the fields. At the Wildcat Canyon Ruin, there are three smallish masonry sites located directly below that have mean ceramic dates within four years and there may be other such sites in unsurveyed areas nearby. At Betatakin, the situation was more extreme as there is little farming land within the canyon. The nearest three sites of the same period are 3 km away on the other side of main Tsegi Canyon where good farming was possible.

Post-1280. Elsewhere in the Kayenta region, there are small amounts of yellowware pottery that postdate the Tsegi Phase but predate 1375 (Adams and Adams 1987; Lipe 1967:313-323). Once the Kayenta area was “abandoned” by the Anasazi, the area remained in the territory of their descendants and was used from time to time for resource procurement and perhaps even small farming outposts. Occasional sherds of Jeddito Yellow Ware that occur on a few Tsegi sites may represent such use of the area.

Navajo. Although the earliest Anglo reference to Tsegi (1859) mentions Paiutes living there, there has been a Navajo presence there probably from prior to Bosque Redondo. As my interest was in prehistoric archaeology, whenever we encountered Navajo sites, I simply marked them on the map. My assistant could often tell me who built the structure and when it was last used. The only

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Figure 2

Wall with loopholes at Hostile House, NA 20558.
Mean ceramic date for site is A.D. 1191.
Table 2
Frequency of Sites by Area and Time Period.

<table>
<thead>
<tr>
<th>Location</th>
<th>Time Period</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-ceramic</td>
<td>ca. 700-</td>
</tr>
<tr>
<td>Cobra Head</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Betatakin</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Bubbling Spring</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Middle Long</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Kiet Siel</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>39</td>
</tr>
</tbody>
</table>

places where Navajo remains were recorded were prehistoric sites that had Navajo structures or, in one case, pottery.

Anglo. Other than Park Service structures and features, the principal Anglo remains in the canyon are from the many archaeological expeditions that have spent time there. The cook area for Neil Judd’s crew when he was stabilizing Betatakin is still visible on the trail to the ruin (Judd 1930:Plate 28B). Although the RBMVE was fairly neat, in that they did not generally leave visible trash dumps or major structural remains, there is a camp of theirs in Water Lily Canyon up Dowozhiebito, called Camp Anasazee (Christenson 1987:18), that I recorded as an archaeological site. The most obvious evidence of Anglo visitation to the canyon are numerous inscriptions on the walls of rockshelters (Knipmeyer 1989; 2002:89-90, 109-10).

SPATIAL PATTERNS

One of my basic questions was the extent to which different parts of the Tsegi Canyon system had different occupation periods. For purposes of discussion, the canyon system was divided into five areas which, except for Kiet Siel Canyon, represent three to four km long sections of main canyon and associated tributaries (Figure 1).

These areas are named by the most prominent feature in the section – 1) Cobra Head, which includes lower Wildcat Canyon, Mummy Canyon (named for a mummy that John Wetherill found there), Cobra Head Canyon (named by the RBMVE for a prominent rock outcrop at its mouth), and main Tsegi Canyon between them; 2) Betatakin, which includes Chiilchin Hólóní (Sumac Canyon, located between Betatakin and Bubbling Springs canyons), Betatakin Canyon, lower Dowozhiebito, and the lowest section of Long Canyon; 3) Bubbling Springs, which includes lower Bubbling Springs Canyon, Jackass Canyon (opposite Bubbling Springs Canyon), and the upper section of lower Long Canyon; 4) Middle Long Canyon, which includes Long Canyon and two major unnamed side branches; and 5) Kiet Siel Canyon, which was examined only cursorily.

Table 2 provides site counts by time period for the five areas considered. A chi-square of this table (Kiet Siel Canyon and undated sites excluded) is 59.74 (df = 18; p<.001) which is highly significant. The specific cells in the table that contribute most to this difference are the preceramic and late Pueblo III periods in the Cobra Head area, both of which are larger than expected. Of the thirteen non-rock art preceramic sites noted in the canyon, ten are in upper Cobra Head Canyon or other areas of lower Tsegi within three
km. Of the 34 post-1200 sites in the canyon 60% of them are in this lowest part of the Tsegi that I surveyed and the majority of the remainder are in the vicinity of the confluence of Long Canyon, Dowozhiebito, and Betatakin Canyon. Although the late component at Swallows Nest has been known for a century, the most significant ruin in the area and probably the largest site in the canyon is an open mesa top site recorded superficially by the RBMVE and later by Jonathan Haas as Wildcat Canyon Ruin. Of the main part of Tsegi, the segment between Wildcat Canyon and Betatakin Canyon was receiving heavy use in the period of 1240 to 1280, while the segment above Betatakin had only four sites (one Scaffold House). Lower and middle Long Canyon had had intensive use in the previous period, but whatever habitation selection process the Tsegi Phase people made, it did not include much use of this area. There are at least two cliffdwellings in upper Long Canyon outside the survey area that have Tsegi Phase occupation.

Focusing more closely at one short (2 km) tributary of lower Long Canyon, called Chiilchin Hóloní, place where there is sumac, by local Navajos, shows a punctuated pattern of use. Mean ceramic dates for the sites with sufficient pottery are 880, 929, 953, 957, 962, 1132, 1136, 1139, 1140, 1143, 1157, and 1158. Because of the large confidence interval for the pre-1100 period, the 929 to 962 dates cannot be statistically distinguished and could represent a single period of occupation. The 880 date could represent a slightly earlier occupation as it is outside the 95% confidence interval for the 957 and 962 dates. The shorter confidence interval for the post-1100 dates means that we can build a case for two separate occupations, one around the late 1130s and one around the late 1150s. The fact that the canyon appears to have no occupation in the eleventh century when Long Canyon just a couple of kilometers away did, indicates the selection criteria for where to live could be very place specific. Issues such as groundwater levels, arroyo cutting, and the effect of previous occupation on soil fertility would vary over short distances and through time. Such environmental conditions could be monitored in the day to day activities of living in the canyon and certainly the lack of ceramic deposition in particular periods does not mean that the canyon was not used for gathering sumac or other resources that occurred there. Of course, there may be social factors such as conflict that could lead to areas not being used. Solution to these questions will not be easy, but refined dating of sites at least initiates the question generating process.

TSEGI CANYON AND BLACK MESA COMPARED

The first use of mean ceramic dating that I made was a comparison of the occupations of Tsegi Canyon and northern Black Mesa (Christenson 1988). The Tsegi Canyon data were based upon my reanalysis of RBMVE collections held at the UCLA Museum of Cultural History (now Fowler Museum) and the Museum of Northern Arizona (MNA). Rerecording of many of these sites and discovery of new sites has allowed refinement and expansion of this sample. The Black Mesa sample of 69 single component sites with enough sherds for date calculation, came from my and Kathy Fernstrom's analysis of ceramic samples from archaeological survey done by the Black Mesa Archaeological Project in the Western Lease between 1968 and 1970. The range of types present in the two areas is generally similar (except for the absence of post-1160 types in the BMAP project area), although Little Colorado White Ware was found in significant quantities on Black Mesa, even though it had not been reported in previous analyses (Christenson 1988:6-7).

Figure 3 shows the frequency of mean ceramic dated components in the two areas by twenty year periods in the pre-1100 period and ten year periods starting at 1100. Because sample sizes are different, it is not the absolute height of curves, but the general shapes that need to be compared.
Both areas have occupations prior to 900, although mean ceramic dating is not going to date enough of the occupations in that period for comparison with later periods. Tsegi Canyon had a significant population in the tenth century, while Black Mesa shows only a late spike. Both areas show a dip at the end of the century, with occupation expanding again first in Tsegi and then on Black Mesa. The increase in sites in the late eleventh and early twelfth centuries, the Pueblo dispersion, occurred in both areas with Tsegi Canyon again taking the lead over Black Mesa, although followed by a distinct drop in the 1100 to 1120 period. A peak in numbers of sites is reached in both areas between about 1115 and 1125 and is followed immediately by a vast drop in sites, with Black Mesa falling to 0 in 45 years and Tsegi falling about 95% in 80 years. The Black Mesa project area was abandoned by 1160 or so (the latest tree-ring cutting date is 1144, the latest mean ceramic date is 1163), but it appears that sporadic occupation occurred in Tsegi Canyon until the final population spurt in the mid-thirteenth century (the largest mcd gap is 1226 to 1240). Abandonment of Tsegi occurred within 20 years of the peak in population, with the latest mean ceramic date being 1279 and the latest tree-ring cutting date being 1286 (because the mcd gives a mean for a ceramic collection and, presumably, site occupation, it will be a poor way to date the abandonment of an area).

Although there is a danger in translating site numbers into population, especially in the thirteenth century when a very few sites had the bulk of the populations, the general trends in site numbers should follow population. The question of where the Black Mesa population went in the period following the peak of population about 1115 may not require long-distance solutions (e.g., Powell 2002:85) but might be answerable by looking at the Tsegi Canyon site curve, which peaks about ten years after the Black Mesa curve and drops at a slower rate. It seems logical that, barring social barriers, populations that couldn’t make it on Black Mesa would try making it in nearby areas where they had “kin” by some definition of the term. Long House Valley, which maintained its population through the twelfth century and Tsegi Canyon, which peaked after the Black Mesa decline are possible destinations for unsuccessful Black Mesa farming families as might be the Hopi country to the south. Although I do not want to overinterpret the data, it is curious that in the late twelfth century the Tsegi site curve peaked before the Black Mesa curve and then dropped as the Black Mesa curve was rising. Could we be seeing evidence of populations shifting between nearby areas depending
upon the local environmental conditions? Mean ceramic dating may be a way of generating evidence of such population movement, although firm support for such behavior requires improved sites samples, improved accuracy of the technique in the pre-1100 period, mean ceramic dating of sites in the area intermediate between northern Black Mesa and Tsegi Canyon (e.g., Long House Valley), and excavation of a sample of the sites.

The question of why populations rose and fell the way they did in the post-1100 period has been addressed in some detail by various authors in Gumerman (1988) and summarized recently by Dean (2002:122-124). To the extent that physical environment is a major factor in such changes, the ups and downs in Tsegi Canyon can be related to general trends in ground water, aggradation-degradation, and rainfall, tempered by specific conditions in individual stretches of the canyon and side canyons. Research specifically focused upon use of the canyon environment for agriculture needs to be done before we can begin to grapple with the issues of how the Tsegi people made their living from day to day, how fluctuations in the environment affected their behavior, and what specific factors are likely to have led them to move from one area of the canyon to another or totally outside the canyon. Not all of the behavior evidenced in the Tsegi archaeological record is attributable to the physical environment. Aggregation of large numbers of people in villages is generally not conducive to the efficiency of day to day activities needed to make a living, since it increases effort in getting to and from fields and in procurement of other necessities such as water and wood. Aggregation is an appropriate response for agriculturalists in situations of conflict (LaBlanc 1999:296) and may also be in certain economic situations not relevant to the case at hand. Time and energy expenditure, and safety have a precarious balance in an aggregated community at periods of resource conflict and the balance in the prehistoric Southwest often tipped towards an unacceptable situation that lead to migration.

### POPULATION CHANGE AND CERAMIC CHANGE

The site frequency changes and presumably correlated population changes indicated in Figure 3 raise issues of how demographic change may be related to ceramic change. I have calculated the beginning dates of the Kayenta Anasazi pottery types, defined as the time when the type reached 10% of its maximum use frequency (this date is more easy to determine than the first appearance of a type; see discussion in Christenson 1994:303). While there is fairly good evidence for an “unbroken” Kayenta ceramic tradition in whiteware and grayware, there is also good evidence for periods of rapid change in decoration and rapid introduction of new technology. Kana-a Gray, which is basically Lino Gray with neck banding is introduced just at the time when Tsegi population is expanding in the mid-ninth century (865). Black Mesa B/W, whose initial dating is subject to some disagreement (Christenson 2000), carries on certain designs found on the earlier Wepo B/W and comes into use in the early part of the growth period in the tenth century (900).

The second quarter of the eleventh century has the greatest ceramic changes of any period, beginning with the introduction of all-over corrugated on grayware vessels (Tusayan Corrugated, 1020), the dropping (or switching to another product) of a two century old trading relationship with southeastern Utah (San Juan Red Ware, stops arriving around 1040)), and its replacement with an entirely new local clay procurement, firing, and tempering technology (Tsegi Orange Ware, 1040), and the introduction of an entirely new design style (Dogoszhi B/W, 1050). All of these changes come at a time when population is growing and expanding.

Early in the twelfth century when population is just about to reach a maximum Tusayan Polychrome begins (1110) and right at the peak of population Moenkopi Corrugated and Flagstaff
B/W are introduced (1030). These three types become the mainstays of the Kayenta ceramic assemblage for nearly a century, a period when more types are dropped than are added. The final period of ceramic change begins about 1220 with the appearance of fully obliterated corrugated (Kiet Siel Gray), followed shortly by negative black-on-white designs (Tusayan B/W, 1230), use of black-on-orange and plain orangeware (Tsegi B/O and Tsegi Orange, 1240), use of white line polychrome (Kiet Siel and Kayenta Polychrome, 1250), and finally the introduction of the mosquito bar design (Tusayan B/W, Kayenta variety, 1260).

There is no real evidence of wholesale population replacement in the sequence, although the changes in the second quarter of the eleventh century come closest. At any given point in time the majority of the ceramics in use were of types that had come into existence prior to the current generation of potters (say, 30 years). Not surprisingly, there does appear to be a correlation of high rates of population growth and ceramic change and also seems to be low ceramic change in the one long period of demographic decline (i.e., 1120-1200).

CONCLUSIONS

Tsegi Canyon has been scene of numerous path-breaking studies providing insights into understanding prehistory and paleoenvironment of the Kayenta region - the first pollen (Sears) and mollusk (Antevs/McKee) samples analyzed in the Southwest; the first stratigraphic evidence of Pueblo I remains overlying Basketmaker III (Kidder and Guernsey at Turkey Cave); significant studies of pottery typology and seriation (Hargrave and Brainerd); important work in dendrochronology and climatology (Hargrave and Dean); and major insights into Tsegi Phase society (Dean and Haas) to name just a few.

These prior studies provide a strong grounding for the work that remains to be done. Mollusk remains erode out along the Tsegi arroyo and are indicators of the type of hydrological environment present. The character and distribution of the marshes and wetlands and how they were used by the prehistoric inhabitants of the canyon are questions that need to be dealt with by both paleoenvironmental work and archaeological excavation.

The issue of how the occupants of Tsegi used Skeleton Mesa and Shonto Plateau is another topic that is ripe for research. Skeleton Mesa is of generally difficult access by my definition of the term, but it was probably not a major problem to the prehistoric inhabitants of the area. Of related interest is the trail system that was used by the canyon occupants to go up and down the cliffs and to cross Skeleton Mesa from one canyon to another. Someone with greater climbing abilities than I will have to take on this question.

Finally, no Navajo archaeology has been done in the canyon. There is still potential for ethnoarchaeological study of twentieth century use of the canyon, but that potential will not last forever as permanent residency ended in the canyon years ago and opportunities to get first hand accounts of this occupancy are steadily declining.
ACKNOWLEDGMENTS

Support from the American Philosophical Society and the National Endowment for the Humanities allowed me to analyze the RBMVE collections at UCLA and MNA and a grant from the Southwest Parks and Monuments Association allowed me to hire an assistant to help in the relocation of RBMVE sites. The staff of Navajo National Monument was more than helpful in my many visits to the canyon.

ENDNOTES

1 I have speculated that Brainerd and Ford could have met at Chaco Canyon in the summer of 1937, where Leslie Spier, another pioneer of ceramic seriation, lectured at the UNM field school (Christenson 1999:69).

2 Previously recorded sites were rerecorded using the Museum of Northern Arizona site form. New sites were recorded in the same way. The RBMVE used the NA site system, but in the very last years only RB numbers were used. I gave new NA numbers to all of these sites that I relocated. Because I did not have a permit for collection, I analyzed artifacts in the field. All reports, site forms, and ceramic counts were filed with the Navajo Nation Historic Preservation Office, the Museum of Northern Arizona, and Navajo National Monument (Christenson 1989, 1990, 1992, 1993, 1996).

3 The population curve (number of structures) generated by Plog (1986:Figure 43) for the eastern lease area is similar in shape, although peaks 15 to 25 years earlier than the one for the western lease used here.

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In June, 1990, Petroglyph National Monument (PETR) was established by presidential decree to “preserve, for the benefit and enjoyment of present and future generations... the nationally significant West Mesa Escarpment, the Las Imagines National Archeological District, a portion of the Atrisco Land Grant, and other significant natural and cultural resources, and to facilitate research activities associated with the resources” (Public Law 101-313). Although a number of national parks and monuments have significant rock art present, Petroglyph National Monument is the only unit of the National Park System to be established primarily for the preservation and interpretation of rock art. Petroglyphs are images scratched or pecked on rock surfaces, whereas pictographs are painted images. The petroglyphs are positioned on a 17-mile volcanic escarpment on the west side of Albuquerque, New Mexico at west longitude 106 degrees 36 minutes and north latitude 34 degrees 3 minutes.

Although the petroglyphs have been photographed for many years, the first rock art survey of the escarpment was done in the late 1960's by the Albuquerque Archeological Society under the direction of Colonel Jim Bain, a pioneer in rock art recording in New Mexico. Some 1500 petroglyphs were recorded, and this survey became the basis for the creation of Petroglyph Park by the city of Albuquerque. In 1985, Dr. Matthew Schmader (Schmader and Hays 1986) and staff of the Albuquerque Department of Open Spaces conducted a survey of 1100 acres of the escarpment and recorded some 10,500 images and 67 archeological sites. As a consequence of this survey, the escarpment was listed on the National Register of Historic Places. This initial survey provided the data which showed the area to be of great cultural significance and worthy of being placed in the National Park System (NPS).

Concurrently with the establishment of the Monument, the NPS established a Geographic Information Center under the direction of Dr. Milford Fletcher at the University of New Mexico in Albuquerque. This center, the National Park Service Intermountain GIS Unit, met early and often with the new Resources Management staff and the first Superintendent, Mr. Steve Whitsall. The first meetings were to determine if the Monument staff could use Global Positioning units (GPS) and computers for mapping petroglyphs and other management purposes. One difference between past rock art surveys and this one is that of locating the petroglyph. The traditional method to locate and survey a petroglyph is to establish datum points and use a tape and compass to determine the distance and angle from the datum point to the petroglyph. To relocate any one figure one must locate the datum point and reconstruct the distance and bearing information.

With global positioning units each petroglyph or panel has a distinct geographic coordinate, which can be relocated independently of any other features. Global Positioning Systems are computerized radio wave receivers which receive signals from several of 26 orbiting satellites. By an intricate set of mathematical calculations, the GPS unit can determine the geographic coordinates of...
the receiver. In the recording process a petroglyph or panel is located and a file of some 150 points is recorded on a roving GPS unit. This file is then compared with a base station file taken at the same time and the estimated error is calculated and applied to the roving file. All points are differentially corrected and all 150 points are then averaged to one location. The accuracy of GPS data varies, but raw data are accurate to about 10 meters whereas corrected data have an accuracy of plus or minus one meter. The inaccuracy of raw data stems from several factors which are outlined in many GPS technical manuals (see Trimble Navigation Limited 1995). One early use of global positioning units was by Denise Smith (1998) who, with technical assistance from the Intermountain GIS Center, used GPS technology to accurately locate petroglyphs at the Abo Unit of Salinas Pueblo Missions National Monument near Mountainair, New Mexico.

To prepare for the Petroglyph National Monument survey, the GIS center staff conducted some initial research, obtained some of the first ever created digital orthophoto quarter-quads (DOQQ’s) and began obtaining digital data from the city of Albuquerque. Digital ortho quads are high-resolution aerial photographs which have been geographically referenced—that is, the image has been stretched or compressed to remove distortions of the image and to fit on-the-ground geographic coordinates. As a consequence, the image has a horizontal resolution of plus or minus one meter, and provides and excellent photographic base map upon which to place petroglyph locations (Figure 1). Although the technology was new when the Petroglyph National Monument project was started, geographically referenced digital photography is now available over the Internet in many locations. The Earth Data Analysis Center in at the University of New Mexico has a web site where statewide digital imagery is available free of charge. The results of the initial studies, along with the establishment of the first public GPS Community Base station in New Mexico, showed that with appropriate software and hardware it was possible to locate petroglyphs to an accuracy of plus or minus one meter and overlay their locations on the photographic base map (Fletcher and Sanchez, 1994). The GIS center bought several

Figure 1
Digital Ortho Photo of west side of Albuquerque. Approximate boundary of Petroglyph National Monument is outlined in white.
Trimble GPS units, a top-of-the-line Micron computer and considerable software which were all transferred to the Monument for staff use. Several Monument staff members received appropriate training in GPS technology and the computer software.

At about the same time frame, the Rock Art Field School, an arm of the Archeological Society of New Mexico under the direction of Dr. Helen Crotty and her husband Jay, held a rock art recording field school at the Monument to teach volunteers how to record rock art. Over the years, the Rock Art Field School has trained dozens of volunteers from New Mexico and West Texas on the intricacies of recording rock art.

So, by mid-1990 the stage was set for the largest rock art recording project in the history of New Mexico. The main elements required were a trained cadre of volunteers to conduct the survey, geographically referenced aerial photography for a base map, several GPS units on hand at the Monument for recording petroglyph locations, a community base station to use in differentially correcting the raw data from the roving GPS units, and new Geographic Information System software from Environmental Systems Research Institute, Inc. called ArcView.

Not only was this to be the largest rock art survey to be conducted to date, two new technologies were to be utilized. The first was to use global positioning units to locate each petroglyph or panel. The use of GPS and GIS in this survey provides a unique geographical location for each locus, or rock with petroglyphs on it. This location is then linked to all the information recorded in the field about the physical location, special features, description, category, technique used, and repatination. The field drawing and photograph are attached to each locus. Most important, the spatial database is completely searchable electronically. Many of the questions that arise when discussing petroglyphs can be addressed with queries of the database. For example, Figure 2 shows the results of a search of the data base in a small area south of Rinconada Canyon. The database was searched for petroglyphs which are categorized as linear designs which face north. Seven petroglyphs meet these criteria, and are displayed as white dots on the digital photograph. As an aside, notice the proximity of housing to the petroglyph site. This close association of
urban dwellers to a significant national cultural resource is of considerable concern to NPS management since it leads to an impossible problem of access and egress. As of September 2002 there have been 8,541 differentially corrected global positioning points taken at Petroglyph National Monument (Gretchen Ward, Cultural Resource Specialist, PETR, personal communication, 2002).

The other use of new technology was in the use of a computer program to analyze data. In the early 1990's Environmental Systems Research Institute (ESRI) modified their popular mainframe software ArcInfo to run on personal computers. The new software was called ArcView, and is particularly suited to handle large data sets and display values in geographic coordinates. ArcView has many of the features of its parent software ArcInfo but runs on a PC rather than a mainframe. ArcInfo is very commonly run software in cities and counties across the nation, and these public entities are often a source of data for use in ArcView. For example, many counties have detailed soils maps in ArcInfo format, which is easily imported into ArcView.

The value of this approach is seen in the publication of two master's theses which have been completed using data from the survey. The first, by Kerri Mich (2000), addressed three questions. Many of the results were not quite what was expected, according to traditional rock art theory. Does a discernible pattern exist in the images or is their placement random? The images are indeed clustered, as one can tell by looking at plots of image locations, now backed with nearest neighbor analysis statistics. It is fairly obvious that images are clustered, as they are even recorded in “concentrations”. Does the placement of an image of one category affect the placement of an image of a second category? The results from this analysis suggest that they do not. It appears that petroglyphs are found in areas that for some reason are more suitable for petroglyphs, rather than certain images occurring together in certain places.

Is vandalism in the national monument related to trail proximity? Yes, but the amount of vandalism and graffiti in close proximity to trails is also dependent on the topography of the area. In areas of long, steep escarpments, units 9 and 10, over 50% of the incidents of vandalism are within 15 meters of the trail at the bottom of the escarpment. The rest are within 15 meters of the top of the escarpment, where there used to be easy access by jeep trail. In areas of short, gradual escarpments, units 23 and 28 for example, graffiti is more widespread, as people don't need trails to get to the top of the escarpment. However, there are more trails running from the bottom to the top of the escarpment, so the majority of graffiti is within 15 meters of trails.

Do the images have any connection to the directional orientation of the rock surface chosen by the artist? Many of the theories about how images are oriented to different things such as visibility, cardinal directions, or prominent landmarks do not seem to be supported by the findings at PETR. It is significant, however, that the majority of images in the four units studied face south, southeast, and east. Why? Is it more relevant the direction that the artist faces than the direction the rock art faces? Perhaps petroglyphs are placed in areas where the artist has a good view. Are concentrations of petroglyphs found in areas with better views? Or is the slope the biggest factor, in the way rocks rest on the surface of the slope, or even in the way the slope gives the artist a place to stand or sit while working? It would be interesting to see if the direction the images face change with data from the rest of the monument, especially in units where the escarpment faces north rather than predominantly south.

The second master's thesis used data from Petroglyph National Monument and five additional rock art sites in New Mexico (Saville 2001). The focus of this study was to use existing
and newly collected data to compare the designs and techniques of kachina images in the rock art record as well as evaluate the landscape context of such images across the Rio Grande Valley and Eastern Mountain region. At Petroglyph National Monument a sample area was made of petroglyph concentration PC28B:07 in Piedras Marcadas Canyon. Data from the petroglyph inventory were used within the ArcView environment to determine the frequency and distribution of kachina images and particular attributes of these images in this provenience. Queries and individual shape files for visual analysis were made for each of the fourteen variables examined in the study. These variables include eyes, nose, mouth, outline, headdress, teeth, ears, facial decoration, symmetry, rock surface, rock incorporation, relation to other elements, direction facing, and technique. Results of the GIS analysis indicate that although a number of design variations are present, kachinas were most commonly pecked into the basalt boulders with round outlines and simple three-dot faces oriented south or southeast. Kachinas in this resource rich landscape are clustered between watercourses, low on the escarpment, and facing a water catchment basin/ agricultural field.

The design of the survey incorporates many of the conventional techniques for recording rock art. Each petroglyph is measured, photographed, drawn and other data are collected such as the direction it faces, height above ground, etc. (Brody, J this volume). Each petroglyph is categorized into several categories such as human or animal figures, degree of repatination, vandalism, etc.

The use of GPS and the computer program ArcView brings new tools to the analysis of rock art. Since each petroglyph or panel has its own unique geographic location, they can be linked to all the other information recorded in the field about the physical location, special features, description, category, technique used, and repatination. Photographs and field drawings are linked to each petroglyph and the computer can query the spatial database electronically.

Under the direction of Jack and Ann Francis, the survey of Petroglyph National Monument is in its sixth year, and there have been more than 24,000 elements recorded of which 534 are associated features—grinding slicks, rock alignments, etc. And 19,000 are actual petroglyphs. The survey serves as a baseline for the number of petroglyphs in the monument, the current extent of vandalism, and the types of petroglyphs inventoried. The locations of the rock art, including photographs and drawings, should prove helpful for future cultural resource studies. The condition of the petroglyphs, as reflected in the photos, will be utilized by law enforcement professionals when evaluating vandalism reports and by cultural resource staff to assess erosion. As a more complete survey of all units in the park is completed, resource managers will be able to query the database to support the planning, resource management, law enforcement, and maintenance programs for PETR.
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Trimble Navigation Limited
INTRODUCTION

Indian Writings, a series of petroglyph rock art panels (Site LA 28044), is one of the most popular areas at Philmont Scout Ranch. Tours of the prehistoric and historic rock art panels are provided to Boy Scouts on hiking treks through the north country of the ranch. Adult Boy Scout leaders involved in training sessions and their family members hike the three miles up the North Ponil Canyon to see these rock art panels and the archaeological sites on the valley floor.

In 1922, Waite Phillips, an Oklahoma oilman, purchased the Urraca Ranch, just north of the settlement of Rayado. Rayado is the original location for the headquarters of the Maxwell and Beaubien (later Maxwell) Land Grant. In 1849, Lucien B. Maxwell and Christopher "Kit" Carson established the Maxwell and Carson Plazas at Rayado and began trading goods and livestock with travelers on the Santa Fe Trail and the soldiers at Fort Union. In a very short time, Phillips purchased many of the smaller ranches around him; eventually establishing a ranch almost 300,000 acres in size (Zimmer and Walker 1988).

Phillips named his ranch Philmont, a combination of his name and "monte", Spanish for mountain (Zimmer and Walker 1988:26). Inspired by Mediterranean architecture observed during a trip to Europe, Waite and Genieve Phillips built their summer home in the Cimarron country, naming it Villa Philmonte. While staying here during the summer, they and their guests engaged in recreational activities that included horseback riding, fishing and polo matches with teams from nearby ranches.

On November 28, 1938 Waite Phillips and his wife Genieve donated the northern country to the Boy Scouts of America so that Boy Scouts "...will be able to have the experiences of our pioneer forefathers who established the traditions and historical background of this high country." (Murphy 1972:208). Thus, Philturn Rocky-mountain Scoutcamp came into existence. The first camping season was summer of 1939, with 189 scouts (Zimmer and Walker 1988:49, 53) hiking the area now known as the "north country". A 1941 Philturn map shows camps and various points of interest, including Black Jack (Ketchum's) hide out, the buffalo herd, and the Indian Writings in the North Poñil Canyon (Zimmer and Walker 1988:48).

LOCATION

Indian Writings (Site LA 28044 [NP 90]) is located in the North Poñil Canyon between Polar and Cottonwood Canyons, approximately 16 miles northwest of Cimarron, Colfax County. This area is the southern part of the Park Plateau, a region of mesas with benches straddling steep-sided and narrow-bottomed canyons that open onto the
western edge of the Las Vegas Plateau and the western edge of the Great Plains (Figure 1).

The North Poñil Canyon is incised into the early Tertiary Poison Canyon and Raton formations (Figures 2, 3). The Poison Canyon formation forms the cliffs in the canyon. It consists of stream deposited, coarse-grained, yellow sandstone and conglomerate. The Raton formation, stream-laid basin deposits of fine-grained yellow and gray fossiliferous sandstone, is present as talus slopes (Robinson et al 1964: plates 2, 3).

CIMARRON DISTRICT
ARCHAEOLOGY

One of the first groups known to have visited Indian Writings was the Philturn Archaeological Expedition, led by Samuel D. Bogan (Bogan 1946; Murphy 1972: 213; Zimmer and Walker 1988: 52). The expedition consisted of Bogan, a Scout Executive from Connecticut, a crew of six Boy Scouts, and Billy Wetsel, a chuck wagon cook. Bogan and his student crew studied scientific excavation techniques for several months prior to arriving at Philturn in August of 1941. They had a very successful expedition in the North Poñil Canyon. Bogan (1946), using his journal entries, published the story of their summer excavations and adventures in a book titled Let the Coyotes Howl. Today, the recovered artifacts, including many perishable items from Box Canyon Rock Shelter, are curated at the Philmont Museum.

In 1953, Gene Lutes, learned about the prehistoric sites of Philmont as an Explorer Advisor on trek (Lutes 1956). He later returned in the summer of 1956, as a Columbia University graduate student under the direction of Dr. Richard Woodbury. Lutes conducted an initial survey of the area and began archaeological excavations in the Poñil country, focusing on the North Poñil

Figure 1
Location of Indian Writings (Site LA 28044) in the North Poñil Canyon (Schematic illustration by Linda Hart).
Based on his discoveries, Lutes proposed that an archaeology program be developed at Indian Writings where special program crews could excavate under the direction of technical field assistants. The focus of excavations was Site LA 27951 (NP-1), a multi-component site on the west side of the North Poñil Canyon. Tours of the petroglyphs and the excavations were provided to Scouts hiking through and to interested groups from the Philmont Training Center. Thus began the Archaeology Program at Indian Writings that continues today.

The cultural chronology of the Anasazi sites in the Cimarron area (Table 1) was developed by Michael Glassow (1972a, 1972b, 1980), based on his doctoral research while directing the summer archaeology program at Indian Writings in the 1960s. The archaeological literature of the Cimarron District includes descriptive site reports by Bogan (1946), Lutes (1959), Baker (1964), Skinner (1964), Kirkpatrick and Ford (1977), and Kirkpatrick (2001). The results of research oriented archaeological surveys have been published by Alpers (1963), Glassow (1972a, 1972b, 1980), and Gunnerson (1959, 1969). Cultural resource management surveys have been conducted by Gallison (1998), Haecker (1986, 1987), Hogan (1984), Michalik (1995), and Oakes (1987) with test excavations by Wiseman (1988). Kirkpatrick provided a regional synthesis of the Cimarron District with northeastern New Mexico (1977) while Cordell (1979a, 1979b) included the Cimarron District in her synthesis of the northern Rio Grande.
Table 1.
Chronology of the Cimarron District (after Glassow 1972a: Table 1)

<table>
<thead>
<tr>
<th>Period or Phase</th>
<th>Date</th>
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<th>Criteria</th>
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</thead>
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<td>Cojo Phase</td>
<td>A.D. 1550-1759</td>
<td>Ceramic</td>
<td>Ocate Micaceous</td>
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<td>Cimarron Plain; Neck banded, Incised, Punctate, and/or Santa Fe Black-on-white</td>
</tr>
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<td>Taos Incised or Punctate</td>
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<tr>
<td>Escritores Phase</td>
<td>A.D. 900-1100</td>
<td>Ceramic</td>
<td>Kiathuthlnanna or Red Mesa Black-on-white</td>
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<tr>
<td>Pedregoso Phase</td>
<td>A.D. 700-900</td>
<td>Radiocarbon sample</td>
<td>1200+/- 80; 1195+/-80 (UCLA 1369a, 1269b)</td>
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<td>A.D. 400-700</td>
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<td>Pre-A.D. 400</td>
<td>Projectile point styles</td>
<td>Stemmed dart points</td>
</tr>
<tr>
<td>Lithic Period</td>
<td>?</td>
<td>Projectile point styles</td>
<td>Folsom point</td>
</tr>
</tbody>
</table>

ROCK ART AT INDIAN WRITINGS

The rock art at Indian Writings is found on the cliffs of the Poison Canyon formation and on large boulders on the canyon floor south of Indian Writings Camp. In 1972, Jean Robertson recorded many of these panels in the Indian Writings area (Robertson 1972). They were later included in a regional study of the rock art of the Raton Section of the Great Plains Province (Robertson and Robertson 1975).

The rock art at Indian Writings is all petroglyph style, usually pecked. However, there are exceptions where the elements are scratched into the rock of the cliff faces. Aside from these two exceptions, all the panels are thought to be prehistoric in age, probably between AD 500 and AD 1300. The exceptions are a horse scratched onto a cliff face (possibly Historic Apache/Ute) and the initials and brands made by early 1900s cowboys who worked in the area.

The natural colors of the cliff faces are typically a very light yellow to gray. However, several of the rock art panels have reddened surface areas into which the rock art designs have been pecked. It is very probable that these rock faces were intentionally burned or fired to create a color contrast between the pecked elements and the modified rock surface. These reddened surfaces are subtle, but are obviously different when looking at other cliff face exposures that do not have rock.

The design elements are typically lines that may connect to one another in an abstract fashion (Figure 4). Concentric circles of different sizes are common. At one panel, concentric circles are superimposed and have lichen growth within the
There are two panels with a horizontal and linear series of humans touching or holding hands. These panels are about .25 mile apart. One is on a large boulder where the panel is between the boulder and the cliff face. The other is in an open area that faces onto the valley floor. Because the surface is eroded and irregular, this particular panel is very difficult to see unless the light is just right.

The most notable rock art element is a large anthropomorphic design that faces the valley floor and Site LA 27951. It consists of a pecked face, arms, and hands (Figure 8). The face has three concentric rings with deep pecked areas for a nose, two eyes, and one ear. The hands are unusual in that the hand to the right of the face has the palm facing out but the other has the back of the hand. This is based on the presence of a pecked areas (Figure 5). One panel has a combination of concentric circle and parallel lines that make right angle turns (Figure 6). Animal related elements include a possible bear paw and turkey tracks (Figure 7).

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The pecked rock art is thought to be prehistoric in age, except for the obviously pecked livestock brands and names made by historic cowboys. In contrast, the Native American scratched rock art element is that of a horse (Figure 9). This element is on the cliff face seen on the right side of Figure 2. Because the Ute and Jicarilla Apache lived in this area, this design is interpreted to have been created by a member of one of these groups. Archaeological sites with Jicarilla and/or Ute material culture are in the area (Glassow 1972a, 1972b, 1980; Gunnerson 1959, 1969; Skinner 1964).

DISCUSSION

The cultural affiliation of the prehistoric sites in the North Póñil Canyon is with the Anasazi of the Northern Rio Grande (Cordell 1979a, 1979b; Glassow 1972a, 1972b, 1980; Wendorf 1954, 1960; Wendorf and Reed 1955). This affiliation is based on the ceramic and architectural data recovered from survey and excavation projects. Schaafsma (1972:185, 1980:160) has noted that the design elements of concentric circles, zigzags, animal tracks, and wandering lines are commonly found in Anasazi panels thought to date between A.D. 1000 and 1300. The radiocarbon dates and ceramic dates (Table 1) from Site LA 27951 (NP-1) and nearby sites agree with the cultural chronology of the Rio Grande Valley. While it is not possible to directly date the rock art elements, these rock art panels are associated with the prehistoric occupation of the North Póñil Canyon.
Since the 1940s, “hundreds of thousands” of Boy Scouts have hiked and explored the canyons, mesas, and valleys of Philmont. And yet, the primary observations of rock art have been limited to the rock art panels at Indian Writings. This may be because of the selection by prehistoric Anasazi of the Poñil drainage for primary settlement in the uplands away from the plains. Alpers (1963) documented many sites along the Cimarron River but did not note any rock art sites. Nor have rock art sites been reported in the Cimarron Canyon between Cimarron and west to Eagle Nest.

The rock art panels at Indian Writings, while simple in appearance, are complex based on the presence of numerous geometric elements, anthropomorphic elements, animal tracks, and random line elements. The North and Middle Poñil Canyons were used by prehistoric peoples, yet the predominate rock art is associated with the North Poñil Canyon. While the area has been hiked and explored for over 50 years, additional surveys and studies by Boy Scouts and affiliated researchers will contribute to understanding the “traditions and historical background of this high country” as sought by Waite Phillips.

ACKNOWLEDGEMENTS

Figures 2 and 3 are by the author, 1972.
Figures 5-9 courtesy of Philmont Museum, Philmont Scout Ranch, Cimarron, New Mexico. Dan Sheehan, Photographer. Photographs were taken in the early 1960s.

I would like to thank Dr. Michael Glassow, University of California, Santa Barbara, Dr. Don Wyckoff and Warren Lail, University of Oklahoma, and Stephen Zimmer, Miami, New Mexico, for their review comments.

A special thank you goes to Jason Schubert, Director, Philmont Museums, who provided not only comments, but most importantly, the historical photographs of the Indian Writings rock art as documented by Dan Sheehan.
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In 1970, the National Park Service (NPS) conducted an archaeological survey of Chaco Canyon. Later in that decade, the Archaeological Society of New Mexico (ASNM), working with the archaeological survey records, recorded almost 500 rock art sites. At the request of the park archaeologist, in 1997 a reassessment of that work began. This project focused on the major ruins or great houses and other highly visible and visited areas of the Park. Comparisons with previous records were made and changes were noted. This provided greater detail and information on known sites, and many more sites, panels and figures were discovered. A foundation for an interpretation and monitoring program was created. This ongoing recording project has produced greater awareness, appreciation, and understanding of rock art, which is now recognized as an integral data set that contributes to our knowledge of those who lived in Chaco Canyon during different periods in the past.

CHACO CANYON

Chaco Canyon contains one of the largest concentrations of prehistoric ruins in the United States (Strutin 1994:6). It is located in the northwestern corner of New Mexico in a high desert, scrub-grassland, presently devoid of trees. People, commonly referred to as the Anasazi or Ancestral Puebloans, inhabited the area from at least the beginning of the common era until sudden abandonment during the thirteenth century (Hayes et al. 1981:14). After several centuries, this land became home to Navajo peoples who moved down from the north and whose descendants live in the area today.

Once the explorers of 1849 visited the newly acquired territory that includes New Mexico reported on the spectacular masonry pueblos that are found along the Chaco Wash and its mesa rims, investigations into the archaeological remains of Chaco Canyon began. By 1907, a monument was established to protect these ruins. Early research, therefore, focused on the masonry structures and the cultural remains found within them. Very little attention was given to the rock art which covers many of the cliffs and boulders of this 10-mile-long canyon. By the mid-twentieth century, however, legislation mandated complete survey of all cultural resources on federal lands. As a result, archaeological survey would include documentation of all types of sites. During the 1970s, the more spectacular rock art sites were found and received the most attention, e.g., the "Sun Dagger" of Fajada Butte (Sofaer et al. 1979). Other studies recorded astronomical sites, such as the possible "Super Nova" depiction (Anderson 1981:54) and the "Piedra del Sol" (Cornucopia et al. 1998). Until recently, however, careful scrutiny and recording of rock art in Chaco Canyon were not major priorities.

CHACO ROCK ART

Historically, the first mention of Chaco Canyon and its archaeology was made by Lt. James H. Simpson, a Washington, D.C. surveyor, in his
report for the 1849 military expedition into Navajo country. He observed a number of hieroglyphics (sic) on boulders (Hayes et al. 1981:4-5). During the 1930s and 1940s, several students examined rock art in and around sites that were being excavated by the School of American Research/University of New Mexico field schools, and park personnel also made note of some petroglyphs (Sowers 1942). These efforts, however, were not extensive and seldom published. The value of these data went unrecognized until much later.

The first archaeological survey conducted of the entire area composing what was then Chaco Canyon National Monument was accomplished from 1972 through 1975 (Hayes et al. 1981). The purpose of this project was to provide a management guide, to gather information relating to population and cultural distributions, and to identify areas for further study (Hayes et al. 1981:2). The published results of this work devote only one short paragraph to the Anasazi rock art (Hayes et al. 1981:38), and there are no photographs to illustrate the style. An equivalent of one page is devoted to Navajo rock art. More comment was evoked regarding United States Army and Spanish Inscriptions. The authors claimed that there were very few paintings in the canyon.

During recent review of the 2,220 recorded archaeological sites within the old National Monument boundaries, rock art was noted for 404 sites (Hayes et al. 1981:131). In the original survey records, the only indications of rock art are the words *petroglyphs* or *pictographs*. Only rarely would the surveyors include a few descriptive words about the rock art images, such as Pueblo designs or horses. In less than half of the rock art site reports are photographs included; then only one or two at the most were taken. As we studied the site reports, we realized that the photographs and the more informative reports were attributable to only a few members of the survey team, usually Thomas C. Windes and Peter J. McKenna. It was apparent that some archaeologists appreciated the significance of the rock art, while others did not. Others may have been unaware of the importance of art in the world. Even recently, some have attempted to discourage the word *art* when describing the images recorded by the early Native Americans, thinking it is a degrading term that should not be applied to anything sacred. They fail to account for the fact that western art was almost exclusively religious, e.g., early Mesopotamia, Egypt, and Greece, for example through the sixteenth century. Thus, this important data set often was overlooked.

**ASNM'S ROCK ART FIELD SCHOOL**

W. James Judge, whose initial transect survey laid the basis for the 1972-1975 National Park Service project, asked James G. Bain, director of the ASNM Rock Art Field School (Crotty 2000) if he would lead a rock art recording project in Chaco Canyon. The resulting field school was held for one week each June from 1975 to 1981, except in 1980 when two weeks were spent. Volunteers, including Helen and Jay Crotty and the author, who had little experience in rock art recording, were assembled. The director selected teams of three. We were sent out to a particular area to locate sites with assigned numbers. These sites were originally marked by metal stakes, some of which had already been pushed over or lost. Working directly from the site reports that indicated where rock art panels had been previously documented, the field school participants located the previously noted panels. Although some recorders went beyond the indicated areas, we generally examined only the areas within the site perimeters mentioned in the surveyor's records.

Some locations of sites and panels often were deterrents to accurate and complete recording. Some of the rock art sites are so hidden that they can be accessed by very small acrobatic people. Some panels are up so high on the cliffs that the reason given by the local Navajo Park workers that "they flew there" seem not such a fanciful answer. Much of the rock art is difficult or nearly
impossible to see and photograph. We have now come to believe that the creators of the images may have purposefully placed their work in positions in which they could only be seen at certain times of the day and in certain seasons. Perhaps they were only meant to be seen by particular persons. In much of the American Southwest, sandstone rocks are covered with an iron oxide patina. In Chaco Canyon, there is very little patina, and when there is it often seems that rock art artisans purposefully avoided it.

All of the rock art that was found was photographed. Often the difficult-to-see and the difficult-to-photograph panels were treated with aluminum powder, a method advocated in those days by Benjamin K. Swartz (1963). A mixture of aluminum powder and water was applied with a brush to give contrast to the photographs; afterwards this mixture was washed off with water.

Forms were filled out according to the New Mexico State Laboratory of Anthropology guidelines. All recorders, even those trained with the same methods, record according to their own interests and limitations. Some of the teams were composed of people who did exactly as they were instructed; others looked beyond and scrutinized the area carefully. As a result, some teams recorded every glyph, every smudge of paint and every human made mark they could identify. Others chose what they thought was significant. Some completely ignored the Navajo rock art. Others omitted all graffiti. Some were athletic and searched the upper reaches of the walls carefully, and some never strayed off the beaten trail. Since we had so many sites to record, we worked rather rapidly and often missed panels that could only be seen at certain times of the day or from particular angles.

CHACO ROCK ART REASSESSMENT PROJECT

In the summer of 1995, Paul P. Steed, Jr. of Dallas, organized a reunion for those who had participated in the ASNM rock art field schools. At this time we visited a side canyon containing many Navajo rock art panels. I realized then that our methods in the 1970s had not been adequate to record all the data. Specifically, the aluminum powder we used to enhance the glyphs was almost impossible to apply accurately to the delicately scratched images and therefore distorted the actual petroglyphs.

Consequently, I proposed to the National Park Service that the old records be appended. This restudy was approved and led to a request from the park archaeologist for further work that would compare the condition of the rock art during the 1970s with the present. Focus was directed to the most heavily impacted areas of the park, especially the locales close to and around the Great Houses, the campground, the visitor center, and park employee residences. In addition, areas situated between sites and on high cliff faces were inspected. Anything previously unrecorded was to be recorded in detail and added to the documentation records. Isolated unrecorded panels would be assigned to the closest archaeological site number. Copious notes would be taken about each boulder, panel, and gallery.

Since 1996, recording sessions have been held each spring and fall to reassess and add to the recording done by the field school. The old records were examined. New forms were created to meet the task. These forms included information about the location, descriptions of the rock art, the ease of access, and visibility to the public. An attempt was made to assign fewer interpretive descriptions to the elements in order to provide a clearer, more useful typology and to discourage erroneous interpretations.

Intrusive methods such as the application of the aluminum powder are no longer used. It is now understood that any act of touching by hand or with any substance can prove damaging and will compromise the possible dating of rock art. All panels were rephotographed with close-ups taken of complex or difficult-to-photograph panels. Because scale drawings are often superior or com-
Supplementary to photography for recording, this method was used to illustrate all complex or difficult-to-see panels. Lee and Stasack (1999:172) point out the superiority of scale drawings over photography for details.

PROJECT FINDINGS

Comparisons of the present condition of the rock art with that in the 1970s reveals changes that have occurred over the years. Based on the records from the previous archaeological survey, the ASNM field school participants missed many rock art panels (Figure 1). This can be attributed to several factors. Covering such a vast area in the time allotted to the field school required rapid movement and allowed only one brief viewing. Because Chaco cliffs and boulders are a red and yellow ochre sandstone which rarely have much patination, they offer little color contrast with the glyphs, making them difficult to impossible to see. Many glyphs are located high on the cliff faces (Figure 2). Neither the survey archaeologists nor the field school recorders looked closely, nor did they look up high on the cliff faces.

Most often the survey and field school included only rock art areas directly associated with the ruins. Frequently the areas beyond structures were overlooked; isolated boulders and boulder fields were rarely examined. Navajo rock art is seldom located in close proximity to ruins due to the traditional cultural taboo against entering the ruins. Therefore, the mostly scratched and difficult-to-see Navajo glyphs were missed (Figure 3). As the reassessment project progresses, we are locating many more elements than were previously recorded. Some of the sites have been expanded, and archaeological sites where no rock art was originally indicated now have been added to the rock art site files. Because these sites were not previ-

Figure 1
One of the many panels located high up on a cliff face which was completely missed by the 1970's rock art field school.

Figure 2
Panels high on the cliff faces often contain the most skillfully produced and complex figures.
Navajo scratched petroglyphs are located on cliff faces and free standing boulders.

Previously recorded, only now do we realize the size of the omission of the valuable cultural information from the earlier survey. We also lost our ability to assess the degree of deterioration and the effects of both the environment and the visiting public on these sites.

Results of our work sessions have been submitted to the park archaeologist and copies are available in the NPS Chaco Culture NHP Museum Archive at the University of New Mexico (Kolber 1998; Kolber and Yoder 1999, 2000, 2001, 2002). The following examples provide a brief summary of the results of this recent work.

Gallo Wash

Because it is located along the current park entrance and contains the campground area, Gallo Wash is the most heavily impacted area in Chaco Canyon. Some of the largest and most complex panels are among those apparently never recorded (Figure 4). Many of the sites have been dramatically altered. Natural deterioration by wind, water erosion, and breakage continues on most surfaces. Numerous new instances of vandalism have occurred in several different forms of graffiti marked over prehistoric and historic images (Figure 5). The almost complete destruction of one of the campground sites attests to the lack of effective monitoring and protection in the past. The absence of any previous documentation of the area's paintings indicates either that the initial recorders missed them or that there is a continuing rock art tradition, both of which are possible (Kolber 1998:10-11).

Una Vida to the Residence Area

From above Una Vida, the canyon wall continues behind the current Visitor Center and park employees' residences, culminating near the junction of Gallo Wash (Figure 6). Again more panels...
were found, mostly near the ruin and on the sections of the canyon wall that protrude out toward the wash. Numerous unrecorded boulders bear Navajo scratched glyphs. Close to the residence area, and unknown to most of the residents, there are boulders containing Anasazi images. Among them are many flute players which are occasionally found in groups in other areas of the park (Figure 7). One of the residence boulders has the largest depiction of a Navajo ceremonial figure yet found in the park. Noteworthy amounts of graffiti cover this image, possibly because the defacers were unable to see the presence of the early figure. Only through careful scrutiny of each surface under varying lighting conditions were these images identified by the current workers.

Hungo Pavi

Between Chetro Ketl and Una Vida is the Great House of Hungo Pavi. Our first efforts in amending the record of Navajo rock art occurred in the side canyon behind this ruin. As usual, we found many more glyphs, some very high up which appeared to be masks and were recognized as such by Hopi visitors to our project. In fact, they located another mask which we had missed, and only recently another was sighted. Boulders with finely scratched images of Navajo women in decorated costumes predominate here (Figure 8). An unusual site was found half way up the slope, an uncommon location, where many glyphs were pecked and incised into a narrow tunnel-like shelter.

Between Pueblo Bonito and Chetro Ketl

Only a small portion of the rock art in the most heavily visited region of the canyon was recorded by the early archaeological survey and the rock art field school. It is in the area between the two largest Chacoan Great Houses, Pueblo Bonito and Chetro
Ketl. On the cliff face which runs behind both sites is a wall of almost continuous rock art images. Below is mostly flat land with several ruins and other archaeological features. Along the base is a worn trail which many visitors use to traverse from one Great House to the next. This trail provides easy access to the rock art; it is interrupted in the middle by a large boulder, which curiously bears no imagery.

Table 1 is a quantitative comparison of the findings and work done in this area. It should be noted only one photograph was submitted by the 1972 archaeological survey crew of any of the rock art for the entire area; and mention of rock art by the surveyors was minimal, which in turn encouraged only minimal recording by the field school. Some of the photographs taken by the field school in 1979 were duplicates of a panel with and without aluminum powder enhancement.

Based on the reassessment of this area, less than 10 percent of the rock art had been previously recorded (Kolber and Yoder 1999:20). Unusual elements were missed were single figures which were created by using the complex technique of combining four manufacturing processes: pecking, abrading, incising, and drilling (Figure 9). Another recently identified technique not previously recorded elsewhere in the Anasazi cultural region, is a bas relief such as is used in the Easter Island rock art style (Lee 1992:26-27) (Figure 10).

Figure 7
Flute players, erroneously referred to as "Kokopelli", are found on many rock surfaces throughout Chaco Canyon.

Figure 8
A Navajo panel which was omitted by the field school shows women dressed in their finest dresses and jewelry.

Figure 9
A combination of techniques was used in various figures to enhance the petroglyphs.

Figure 10
An ovoid form protrudes about six centimeters out from the cliff face.
Yet another uncommon manifestation is the large expanses of diverse grooves clustered on sections of the cliff faces (Figure 11). These enigmatic features, which required much exertion to create, appear to be associated with natural and enhanced holes (Bertsch 1986) and is only questionably termed rock art. Some refer to them as sharpening grooves. Panels of fine, exacting workmanship have been found in high positions on the cliff faces where access is virtually impossible without great effort and the assistance of ropes, ladders, scaffolding or ramps (or the ability to fly) (Figure 12). Discovery of these panels provides support for new theories about the use of this area for public presentations (John Stein, personal communication 2000).

Here there is not as much recent vandalism as in Gallo Wash. This probably can be attributed to the greater visibility and monitoring within the major ruin area. However, a wall directly behind Pueblo Bonito bears NPS inflicted chopping marks resulting from efforts to obliterate graffiti. Nearby and close to the ground, a well-known panel of six-toed feet was vandalized several years ago and consequently covered with soil (Bertsch 1986). A cross was scratched into one of the feet. Other scratches occurred as well. This destruction and subsequent interment was supposedly record-ed, but no record can be found. There are previous photographs of the panels, and one of the park employees did photograph the damaged feet before they were buried.

Other Areas

The Chaco Rock Art Reassessment Project has now completed work in the areas between Pueblo Bonito and Kin Kletso, from Kin Kletso to Cly's Canyon, behind Casa Rinconda, and along the Wijiji Trail. Similar findings have resulted. As we continue working in the heavily visited areas close to the major excavated ruins, more and more unrecorded panels are coming to light. Additionally in each area, we have found what we have now come to designate as "Great Panels." These are large panels generally measuring from about 3 to 12 m² and containing from 10 to 100 carefully executed elements. In many instances these panels are in clear view high on the cliff face above heavily visited locations; yet, they have never been noted.
IMPLICATIONS AND CONCLUSIONS

Archaeologists, both in the past and today, often fail to mention or consider rock art in their studies in Chaco Canyon. Perhaps one of the most important outcomes of our project is the realization that the rock art of Chaco Canyon is indeed impressive and worthy of in-depth study. This is a significant achievement because it has not been acknowledged by rock art experts in the past. For example, Polly Schaafsma (1980:105-162), the most frequently cited rock art expert in the United States, makes no mention of the Chaco Canyon rock art in her section on the Anasazi in Indian Rock Art of the Southwest, although she does include two photographs of Chaco rock art. This absence implies that there is little value in Chacoan rock art. Fortunately, this neglect is being remedied. Careful, detailed inspection of all of the rock surfaces within the project area has surprised us with technically superior, complicated panels heretofore unnoted.

Other benefits have resulted from our investigations. Awareness of rock art is growing, as evidenced by replications of rock art images in art, advertising, and trinkets for sale, rock art viewing and the images themselves. More and more people are visiting sites and asking for access to both protected and unprotected locations. Along the cliff wall between Pueblo Bonito and Chetro Ketl there is a high concentration of petroglyphs from differing periods of time. These images were created using varying and combined manufacturing techniques and diverse subject matter, which lend themselves to interpretive and educational signage. Navajo examples are present, as well as a Kachina mask painted by a Zuni tribal workman employed on an archaeological project during the 1920s (Hayes et al. 1981:10). This area has now been turned into an official rock art trail with numbered panels and an accompanying trail guide. A consequence of this educational effort will hopefully be greater protection and less tendency toward vandalism.

NPS now recognizes the importance of this cultural resource. During the 1970s, the rock art recorders were not considered valuable colleagues. This attitude has been completely reversed; the present administration and staff show much interest and support for our project. Training sessions about rock art have been given to the Navajo interpretive rangers, as well as seasonal employees to increase their facility to appreciate, understand, and present rock art to the public. They have been guided to rock art sites previously unknown to them, both within the park and nearby. During field sessions, our team provides evening lectures to the public; recently one of the Navajo park rangers began to give a presentation in this educational program.

In an effort to compare old records with existing panels, we realized that there was a lack of organization to the files. Records from various projects have been scattered among various institutions and repositories. Files of some of the most impressive and significant sites are missing. We have compiled a list of all Chaco rock art resources at various places and have made suggestions for managing the records. All of our collected information has been entered into a database.

Our recording methods are now considered the standard for all Chaco park rock art projects. As a result, all new proposals for rock art projects are channeled through us to insure they meet these standards.

In the recent past, more lands have been added to the park. These lands have been surveyed, and, of course, more rock art has been found (Gleichman 1990). None of this is yet recorded. To date, about three-fourths of the original projected areas for study in the park have now been reexamined and recorded. All the records need to be studied and published so as to make this data available and encourage further research. Several years will be needed to complete the present reassessment pro-
ject, but there are indications that Chacoan rock art promises intriguing insights and increased understanding of this complex society. Project records are currently being used by other researchers, including on project undertaken by a student of Kelley Hays-Gilpin at Northern Arizona University (Carver 1998). Others are underway.

This project points out the need for and validity of reevaluating the documentation of previously recorded rock art sites. The initial attempts at recording rock art provided only a brief overview of what was there and where it was located. These early efforts were certainly valuable, as they now provide a basis for comparison and a starting point for applying new and more advanced knowledge and techniques to the task. But, rock art recording has advanced significantly over the past 25 years. By using both manual and technological improvements, we can gain a greater understanding and appreciation the cultures that created the art. We can also better protection of rock art, as the some new technological advances can serve as monitoring devices for both the condition of the rock art and upgrade the condition of the records.

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When archaeologists think about early Pueblo art, their thoughts often turn to the spectacular wall decorations that appear during Pueblo IV, especially in the Hopi and Rio Grande areas (Brody 1991; Crotty 1995; Dutton 1963; Hibben 1975; Peckham 1981; Smith 1952). Although earlier wall art is not nearly so sophisticated or spectacular, it is present in several sites in the Anasazi region. The earliest example, at Alkali Ridge in Utah, is assigned a Pueblo II date (Smith 1952:55-68, but see Brody 1991:59 for anomalies that might date to Basketmaker III). Sites in Montezuma County and Mancos Canyon in Colorado, plus Chaco Canyon in New Mexico, provide additional examples of Pueblo II wall decorations. By Pueblo III a larger area was encompassed. It extends to the Gallina area of north central New Mexico on the east, and to near Zuni and the Upper Gila and Tularosa regions located along the New Mexico-Arizona border on the south. By this time, the number of examples in the Four Corners area had increased and the largest number of murals is found in the Mesa Verde cliff dwellings. Thus, it would seem that this practice of decorating walls began in the Four Corners area and spread outward to include the Rio Grande valley during Pueblo IV. Here I will focus on Chaco Canyon, where there is considerable diversity in design elements that were either incised or painted on plastered walls or incised into sandstone building blocks.

EXAMPLES OF CHACOAN WALL DECORATIONS

Although Smith (1952:57) provides a comprehensive review of kiva murals known at the time of publication, Truell (1986:188-189, 296) updates the available information for small house sites in Chaco Canyon, and Brody (1991:57-68) includes wall murals from Chaco Canyon in his evaluation of Anasazi painting, there is no compilation of known examples from the canyon (Table 1). This section will summarize data on the placement of wall decorations, the types of figures included, and the techniques used to create these decorations. Although the sites listed in Table 1 may represent a sampling problem, these sites are located in an area (Figure 1) that Lekson (1984:272; 1988:79-88) defines as “downtown” Chaco, the center of activity in the canyon during the late A.D. 1000s to early 1100s when maximum construction events at great houses took place.

Great House Sites

Pueblo Bonito. Complete excavation at Pueblo Bonito (Figure 2) uncovered six examples of wall decoration, but none was illustrated (Judd 1964; Pepper 1920). Different decorative techniques and design styles appear in both rooms and kivas. Two sandstone blocks were incised; one of these appears in the south wall of Room 245 and the other on the west wall of the court near Kiva A. The latter stone was found nearby and placed in the wall during stabilization; it has a zigzag design.
## Table 1
Wall designs/murals in Chaco Canyon sites.

<table>
<thead>
<tr>
<th>Site Name/No.</th>
<th>Provenience</th>
<th>Description of design</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Great houses:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pueblo Bonito</td>
<td>Room 83, north wall</td>
<td>Sandal incised into plaster</td>
<td>American Museum of Natural History Photo 301. McNitt #78764</td>
</tr>
<tr>
<td></td>
<td>Room 97 (under Room 92),</td>
<td>On blackened wall: Bear tracks (made by pressing fist against plaster, then adding toes), nail marks and snake like lines; two impressions of a hand, with snake-like series of fingernail marks</td>
<td>Pepper (1920:304)</td>
</tr>
<tr>
<td></td>
<td>southeast wall. (Next to</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>square kiva, Room 3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Room 245, south wall</td>
<td>Several contiguous stones with incised design</td>
<td>Judd (1964:135)</td>
</tr>
<tr>
<td></td>
<td>Room 350</td>
<td>Two human hands, a human foot, and miscellaneous lines</td>
<td>Judd (1964:129, 336-337)</td>
</tr>
<tr>
<td></td>
<td>Room 351</td>
<td>White rectangle with 7 “sawteeth”</td>
<td>Judd (1964:129, 336-337)</td>
</tr>
<tr>
<td></td>
<td>Wall west court near Kiva A</td>
<td>Sandstone block with zigzag incised</td>
<td>Judd (1964:135, 207)</td>
</tr>
<tr>
<td>Chetro Ketl</td>
<td>Room 18, east jamb</td>
<td>Incised geometric designs</td>
<td>Lekson (1983:Figure II:2)</td>
</tr>
<tr>
<td></td>
<td>Room 22,</td>
<td>Incised hand, sandals, sandal lasts, geometric designs</td>
<td>Lekson (1983:Figure II:3)</td>
</tr>
<tr>
<td></td>
<td>Room 106, east wall</td>
<td>Painted rectangles</td>
<td>Lekson (1983:Figure II:6, 74)</td>
</tr>
<tr>
<td>Pueblo Alto</td>
<td>Room 143, north wall</td>
<td>Painted designs, possibly with human figure</td>
<td>Windes (1987[II]:Figures 2.30 and 2.31)</td>
</tr>
<tr>
<td></td>
<td>Room 147, east and west</td>
<td>Painted designs</td>
<td>Windes (1987[II]:Figure 2.37)</td>
</tr>
<tr>
<td></td>
<td>walls (possible clan or</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>society room</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Room 172, east wall</td>
<td>Incised geometric designs on sandstone blocks</td>
<td>Windes (1987[II]:Plate 6.3)</td>
</tr>
<tr>
<td>East Ruin</td>
<td>Room 6 (Same as Room 14 or</td>
<td>Painted rectangles</td>
<td>Windes (1987:529, Figure 7.4)</td>
</tr>
<tr>
<td></td>
<td>Kiva 14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pueblo del Arroyo</td>
<td>Room 44, north wall</td>
<td>Right footed sandal figure chalked on plaster wall</td>
<td>Judd (1959:Plate 14, 206)</td>
</tr>
<tr>
<td>Kin Kletso</td>
<td>Kiva D</td>
<td>Painted dado</td>
<td>Vivian and Mathews (1964:50)</td>
</tr>
<tr>
<td><strong>Small Sites:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bc 50</td>
<td>Kiva 3</td>
<td>Incised designs on plastered wall include house, maze, fish, and tree</td>
<td>Brand et al. (1937:78-79)</td>
</tr>
<tr>
<td>Bc 51</td>
<td>Room 16 (substructure)</td>
<td>Red pigment on plaster</td>
<td>Kluckhohn and Reiter (1939:32)</td>
</tr>
<tr>
<td></td>
<td>Kiva 5</td>
<td>Painted human with headdress; incised details in eyes and hands</td>
<td>Kluckhohn and Reiter (1939:38-39)</td>
</tr>
<tr>
<td></td>
<td>Kiva 6</td>
<td>Painted animals and humans, possibly hunting scene</td>
<td>Kluckhohn and Reiter (1939:38-39, Figure 6)</td>
</tr>
</tbody>
</table>
Figure 3 illustrates a pair of sandals that were engraved in plaster on the north wall of Room 83. Painted human extremities occur in Room 350 and white rectangle with sawteeth in Room 351. In Room 97 (beneath Room 92) a blackened plaster wall includes bear tracks made by pressing a hand into wet plaster. Two impressions of a hand, as well as other incised lines, possibly made by using finger nails, were also noted.

Although these different styles occur in rooms in different areas of the site (Figure 2), their appearance was probably late in the occupation of

Figure 1
Location of Chaco Canyon sites with wall decorations. (Courtesy of Chaco Culture NHP Museum Archive, University of New Mexico, Albuquerque.)

Figure 2
Ground plan of Pueblo Bonito. (Courtesy of Chaco Culture NHP Museum Archive, University of New Mexico, Albuquerque.)

Figure 3
Pueblo Bonito, Room 83, sandal etchings on north wall. (Tracing from American Museum of Natural History Photograph 301 and McNitt Collection No. 78764 on file at Chaco Culture NHP Museum Archive, University of New Mexico, Albuquerque.)
Pueblo Bonito. Rooms 83 and 97 are located in the central section that is part of the earliest construction at Pueblo Bonito. This area was remodeled and used quite late. Room 245 was constructed during Stage III A, to which Lekson (1984:134) assigns a construction date of A.D. 1050-1060. This room block was repeatedly modified and rebuilt (Judd 1964:Figures 4, 5 and 6). Judd (1964:129, 336-337) characterizes Room 350 and Room 351 as possible subterranean cult
Chetro Ketl. Excavations of sections of Chetro Ketl uncovered wall decorations in three rooms. Two, Room 18 and Room 22, are located in the southeast corner of the central room block in a late addition to the pueblo (Stage XII; A.D. 1090-1095) (Lekson 1983:263). They are part of the Kiva G complex (Figure 4).

Room 18 is divided into two spaces by a low wall with a door; masonry steps on the east side of the wall allow passage into the smaller western area. Based on Stubbs' (1929) original description of Room 18, Lekson (1983:14) believes the room contained a room-wide platform. A door in the east wall enters the plaza, but doors in the north and south walls had been sealed. Lekson (1983:Figure II:2) illustrates designs engraved in plaster in the east jam of the door in the south wall. The incised figures (Figure 5) resemble designs painted on pottery (e.g., hooks or flags, terraced triangles).

Room 22 is a featureless room located two rooms north of Room 18. A “T” shaped door on the east side opens onto the plaza. Lekson (1983:Figure II:3) illustrates 13 designs that were engraved in the wall plaster. A human hand, a pair of sandals, and perhaps five sandal lasts can be identified; the remaining examples are geometric in nature (Figure 6).

The third example of wall decoration was found in Room 106, which is located on the west side of the central room block (Figure 4). This room is part of the Stage II construction that Lekson (1983:234) dates around A.D. 1050 to 1055. The front rooms in this construction phase were later subdivided and modified, possibly around A.D. 1070 to 1075. The east wall of the first story was painted with dark blue and red-brown rectangles in a stepped pattern in two groups, a north and a south group (Figure 7). Brody (1991:Plate 11) indicates stick figures that are unrelated to the painted design also are engraved into the plaster.

Pueblo Alto. Although only 10 percent of this great house (Figure 8) was excavated, two rooms in the central room block that was originally constructed between A.D. 1020 and 1040 exhibit evi-
Figure 8
Ground plan of Pueblo Alto.
(Courtesy of Chaco Culture NHP Museum Archive, University of New Mexico, Albuquerque.)

dence of painted decorations. Much remodeling of this central area around Kiva 10 ensued, and the last use of this area was in the early A.D. 1100s (Windes 1987[II]:164-171). The plastered walls in Room 143/236 and Room 147 have painted designs that are quite different from those found at Chetro Ketl.

Room 143 is a long narrow room that fronts an early suite of rooms on the west side of the central room block. This room was once subdivided by a jecal wall, the eastern half being linked by doors to Room 147 and Kiva 10. The early A.D. 1100s remodeling included a room-wide platform, but the room division was such that inhabitants of the two suites had access to this area (Windes 1987[II]:116). The most complete image appears on the north wall next to Niche 1 (Windes 1987[II]:Figure 2.30). The second appears between Niche 1 and Vent 13 on the same north wall (Windes 1987[II]:Figure 2.31). Yellow ochre and gypsum were used to create the gold and white designs that may include human figures at the bottom (Figure 9).

Room 147 probably began as an unroofed space between the eastern and western room suites in the central room block (Figure 8). During the late A.D. 1000s when Kiva 10 was reduced in size, Room 143 was extended over the kiva walls, and Room 147 was formed (Windes 1987[II]:136-147). This space then may have been used as a clan room. Because fir pollen was recovered in this room, Windes (1987[II]:116) suggests it was used for specialized activities; it also contains the best evidence for cooking in the central room block. Patches of yellow ochre on the east and west walls (Windes 1987[II]:Figure 2.37) are sparse (Figure 10), but they bear some similarity to the wall decorations found in Room 143.

Two incised sandstone masonry blocks were exposed during wall clearing in Room 172, which is located in the West Wing (Windes 1987[I]:Plate 6.3). The lower
Figure 9
Pueblo Alto, Room 143, paintings on north wall: left, next to Niche 1; right, between Niche 1 and Vent 13. (Courtesy of Chaco Culture NHP Museum Archive, University of New Mexico, Albuquerque.)

Figure 10
Pueblo Alto, Room 147, painting on east and west walls. (Courtesy of Chaco Culture NHP Museum Archive, University of New Mexico, Albuquerque.)

Figure 11
Pueblo Alto, Room 172, sketch of geometric designs incised on sandstone blocks. (Tracing from Windes 1987[II]:Plate 6.3.)

block had two circles; the upper a cross hatched pattern (Figure 11).

East Ruin. As part of the Pueblo Alto complex, this small site of approximately 13 rooms is linked to Pueblo Alto by Major Wall 1. Kiva 14, built inside Room 6 probably in the early A.D. 1100s, is decorated with large rectangles painted on the lower 100 cm of the wall (Windes 1987[II]:540-542, Figure 7.4). The yellow, black, and whitish-gray rectangles of uneven width were applied in a generally horizontal row (Figure 12).
Pueblo del Arroyo. In the central room block constructed during Stage Ia (A.D. 1065-1075; Lekson 1984:209-223) is Room 44 (Figure 13). This is an original plaza facing room; there are no floor features present on the first floor. Evidence for remodeling includes a second floor with a firepit and storage bin and a third floor with only a slab-lined firepit. A doorway in the east wall and five steps lead to the roof of Kiva F, which is part of Stage IIIA construction (A.D. 1105+; Lekson 1984). A series of blocked doors in Room 44 were probably sealed during this time. Wall plaster just east of a niche in the north wall is decorated with a chalked sandal (Figure 14) (Judd 1959:205-206, Plate 14).

Kin Kletso. A late addition to the east side of Kin Kletso (Figure 15) includes two rooms and Kiva D. Lekson (1984:245) suggests construction sometime around A.D. 1130+. This late kiva has five masonry pilasters, two west wall niches, and two floors within its 3.65 m (12 ft.) diameter space. Vivian and Mathews (1964:51, Figure 30; Brody 1991:64) describe a set of colored bands that went along the bench face and possibly the pilasters. This red, white, and yellow horizontal decoration (Figure 16) is associated with the lowest floor level; the upper floor covers part of the design.
Small House Sites

Wall decorations are reported for three small house sites, Bc 50, Bc 51 and Leyit Kin, located on the south side of the Chaco Wash between Casa Rinconada and Werito’s Rincon. Although Truell (1986:188-189) indicates the use of plaster in other excavated rooms in small house sites in the late A.D. 1000s, none of those walls has either incised or painted designs.

**Bc 50.** Excavations (Brand et al. 1937) and stabilization of this site uncovered approximately 29 rooms and four kivas. Kiva 3 is a San Juan style kiva with four pilasters, a sipapu, a recess, and a ventilator. Still remaining at the time of excavation were seven groups of figures incised on the wall plaster (Hibben 1937:78-79; Plate Xa and b; Brody 1991:59, Figure 46). Hibben (1937:79) interprets the patterns to possibly represent a possible house, a maze, a fish, and perhaps a tree (Figure 17). Traces of black and white paint were found on the north wall, but no designs could be discerned. Although Brody (1991:59) suggests this kiva may have been built as early as A.D. 922, Truell (1986:Figure A.103) indicates Kiva 3 would have been in use during the late A.D. 1000s to early 1100s.

**Bc 51.** Excavations and stabilization at Bc 51 continued after the initial report by Kluckhohn and Reiter (1939). Over 50 rooms and seven kivas have been identified. Truell (1986:Figure A.104) indicates which sections were probably in use during the late A.D. 1000s to early A.D. 1100s. There were several examples of wall plaster with paint. Little is known about the substructure under Room 16, where red paint adhered to the plaster. Two kivas from the main structure also exhibited designs.

Kiva 5 (which is partly beneath Kiva 3) has 13 layers of plaster. The second and third coats reveal partially destroyed murals in white gypsum, plus traces of blue and red paint. Crude representations of a human figure, possibly wearing a headdress, and with incised details of the hands and eyes are recognized (Brody 1991:59, Kluckhohn and Reiter 1939:38).
Kiva 6 has 31 layers of plaster on the southwest wall. Layer 5 has evidence of humans and animals, possibly in a hunting scene (Figure 18) painted in white with a slight bit of red on the bench face (Brody 1991:59, Figure 47; Kluckhohn and Reiter 1939:38, Figure 6).

Leyit Kin. Three kivas at Leyit Kin (Figure 1) date to the late 1000s to middle 1100s. Kiva B has a painted dado around the bench face. Dutton (1938:49-59) indicates that a yellow-brown limonitic paint was applied to white gypsum plaster, but no remains of designs were found. This kiva is associated with the last use of the site.

DISCUSSION

Although this sample of wall decorations is small, we can ask whether there are similarities among the various methods of application, colors, styles, or placement within the sites in Chaco Canyon and the larger region.

Incised designs (n=8) are less common than painted ones (n=11). Incised sandstone blocks have been found only in two sites: at Pueblo Bonito (Room 245 and the sandstone block near Kiva A) and at Pueblo Alto (Room 172). Each is different (zigzag versus cross hatching and concentric circles). Incised decorations on plaster are more common, but also vary considerably both within one site and among sites. At Chetro Ketl, the geometric figures in Room 18 (Figure 5) are very different from the hand, sandals, and other images in Room 22 (Figure 6) in the same room block. At Bc 50 a house, maze, fish, and possibly a tree were apparent (Figure 17).

Data from other sites in the region also indicate considerable variability in this decorative technique. At Betatakin in Tsegai Canyon, Arizona, drawings include horizontal bands with repeated fret or terrace designs (Judd 1930:12-13, 21, Figures 1 and 2). Animals, buildings, and terraces appear in Kiva K at Cliff Palace at Mesa Verde (Fewkes 1911:32), and crude geometric figures, including horizontal bands of cross-hatched triangles and a series of concentric rectangles are reported for a kiva at the Village of the Great Kivas in the Zuni Region (Roberts 1932). There seem to be no relationships among the incised designs; each example uses different symbols that appear in various locations, e.g., door jambs, on room walls, and in kivas.

Sandals are unexpected subjects; such images are rarely depicted. Crotty (personal communication, 2002) considers the number found in Chaco a concentration. At Pueblo Bonito, the incised
image on plaster (Figure 3) is more elaborate than the one chalked on the plastered wall in Pueblo del Arroyo (Figure 14). These are different from the incised sandals on the plastered wall of Room 22 at Chetro Ketl (Figure 6). The variation in designs on the sandals might suggest a number of different decorations or methods of making footwear.

Geometric figures painted on plaster are found as wall decorations both in Chaco Canyon and throughout the Anasazi region during Pueblo II and Pueblo III (Brody 1991:57-68; Smith 1952:55-68). In Chaco Canyon these include a white rectangle with sawteeth in Room 351 at Pueblo Bonito. Without an illustration it is not possible to compare this with the sawteeth in the painted rectangles from Room 106 at Chetro Ketl (Figure 7). The linear arrangements of rectangles in Room 106 and Kiva 6 in the East Ruin of the Pueblo Alto complex (Figures 9 and 12) do differ in size of the rectangles and their placement along the walls. In the kiva of the East Ruin, a horizontal line of rectangles around the bottom of the wall is all that remains; the wall of Room 106 at Chetro Ketl reveals placement in a “V” and an inverted “V” pattern, possibly indicating a large zigzag pattern once may have been present along this wall. Smith (1952) reports a number of different types of decoration throughout the Anasazi region. Band designs with triangles and rectangles accompanied by dots are the most common elements reported. Frets and bands of designs are not unusual during Pueblo III.

Representations of anthropomorphic and zoomorphic figures appear in several sites. Parts of humans are found at Pueblo Bonito (extremities in Room 350), at Pueblo Alto (two possible human figures at the bottom of the designs in Room 143, Figure 9), and at Bc 51 (human extremities in Kiva 5 and a possible hunting scene in Kiva 6, Figure 18). The possible hunting scene is the most extensive indication of human behavior. The portrayal of the animal figures in this scene are more like those from the Gallina area (Smith 1952:Figure 7b). These designs are quite different from another possible hunting scene that was recorded at New Fire House at Mesa Verde (Smith 1952:Figure 7f). Brody (1991:59, Figures 47 and 48) notes a similarity between the hunting scene and a rock art panel in Mockingbird Canyon in Chaco Canyon.

One of the figures from Kiva 6 at Bc 51 appears to be a humped back flute player without a headdress (Figure 18). Smith (1952:63, Figure 7f) comments on the crude human figures with humped back, large headdress, erect phallus, and holding a bow at New Fire House. Fewkes (1916:96; 1921a:87-88, 1921b:45) associates this figure with
the Hopi New Fire cult that includes "kokopelli-like" figures. Fewkes speculates on the assimilation of the Mesa Verde people into the Hopi community because certain fire rites had been associated with tribal initiation ceremonies that include phallic rites. Another human playing a flute was recorded at Sandal Cliff House in Mancos Canyon (Chapin 1892:122). Closer to Chaco Canyon at LA 17360 is a late kiva that has representations of a humpbacked flute player and a large crescent on white plaster above a dark brown dado pierced by four figures (Brody 1991:59, Figure 49; Doyel et al. 1989; McAnany 1982; Silver 1982). An 1190 date is assigned to the kiva, and Brody (1991:59) suggests this image may be a link to later art associated with the Mesa Verde occupation at Salmon Ruin.

In Chaco Canyon, dados are present only in kivas. Vivian and Mathews (1964:50) indicate the use of yellow, white, and red in Kiva D at Kin Kletso, but Dutton (1938:49) notes only traces of a yellow-brown limonitic paint in Kiva B at Leyit Kin. Outside of the canyon Smith (1952) reports a number of Pueblo II and Pueblo III dados in both kivas and rooms. Some consist only of painted bands in different colors; others include geometric designs that resemble common pottery decorations (Smith 1952:57-58). In many instances the upper wall is white and the lower black or red.

This review provides considerable evidence for variability in types of designs and their execution in Chaco Canyon, even within one site (e.g., Pueblo Bonito or Chetro Ketl). There is little evidence for interaction among those who used different large and small sites. Brody (1991:68), however, suggests there are definite ties between ceramic and rock art imagery; these ties need further investigation.

Several other observations also need further research. These include a possible ceremonial function for some of the Classic Bonito Phase room suites, the possibility of more than one group utilizing two of the great houses, and the possible formalization of rites by extended families or larger social units during this period.

Even though there is considerable variation in the location of images (room versus kiva), the functions of some features in which they appear is likely to have been ceremonial. The examples from Pueblo Alto are found in rooms associated with Kiva 10. At Pueblo del Arroyo, Room 44 is linked to Kiva F by a stairway. At Pueblo Bonito such close associations are less obvious; however, Rooms 350 and 351 are associated with Kiva 2-D. Two other rooms (85 and 97) are in areas that are considered to have special ritual or ceremonial significance (Neitzel 2003), but Room 245 is in the east wing and has no cultural remains that indicate it was either a storeroom or rectangular clan room. At Chetro Ketl, Rooms 18 and 22 are part of the Kiva G complex, but Room 106 is more difficult to associate with other activities. In an area north of this room are several rooms that contained pieces of painted wood similar to those used in historic Pueblo ceremonies (Vivian et al. 1978). The late examples at Kin Kletso and the East Ruin of the Pueblo Alto complex have decorations along the banquette of the small kivas. The earliest example from a small site, however, is on a room wall (Be 51 substructure under Room 16) while the remaining examples are from small kivas.

The variability in wall decorations within one site, e.g., Pueblo Bonito and Chetro Ketl, suggests more than one group may have used different areas within the great house. At Pueblo Bonito, both Akins (1986) and Schillaci et al. (2001) distinguish between two different genetic lineages in the burial populations recovered in the northern and western sections of the oldest part of the house. Windes and Ford (1992) indicate that the northern section is slightly older than the western section, and there is some difference in the ground plan for those rooms as well (Figure 2). Hudson (1972) discerned differences in units of measure between the eastern and western sections where Type 3 masonry construction (Judd 1964) is evident. He suggests that two labor forces shared a
common construction plan but used two different standards of measurement to implement this plan. At Chetro Ketl, the two areas where wall decorations are located are on opposite ends of the central room block of this great house. Lekson (1983:244) observed differences in the Stage II (A.D. 1035 to 1040) construction. The eastern half of the room block has smaller square front rooms; the primary roof beams parallel the plaza. In the western half, the front rooms are larger and the roof beams are perpendicular to the plaza. Doors on the east tend to be short and rectangular, while those on the west tend to be tall and broad (Figure 4). If the differences between the early construction during Stage II represent two populations, be they lineages, clans, or sodalities, it is possible that their artistic expressions also differed in that one used engraving to mark the plaster and other painted plaster during the later occupation of this site.

In contrast, at Pueblo Alto and Pueblo del Arroyo, the wall decorations appear in the central room blocks. At Pueblo Alto the presence of wall decorations occur in an area that initially divided the early room suites into two sections. Later remodeling of these rooms linked two sets of room suites, which suggests unity rather than division of the inhabitants during the A.D. 1100s. Windes (1987[II]:136) also notes that Room 147 is in line with a shrine-like structure (Plaza Feature 5) and an entrance into Plaza 1 at the center of the late enclosing arc (Figure 8). A similar central location for Room 44 at Pueblo del Arroyo might also suggest the wall decorations represent the presence of one group.

These data suggest there may be differences between the great houses themselves. Pueblo Bonito and Chetro Ketl are the largest great houses in existence during this period, whereas Pueblo Alto and Pueblo del Arroyo have fewer rooms and are in the second tier for great house size (Powers 1984; Schelberg 1982).

All of the Pueblo II examples given by Smith (1952) appear in small kivas. His Pueblo III examples include decorations on kivas and room walls. In Chaco Canyon, we may be seeing evidence for temporal differences, or the functions carried out may reflect participation by families (nuclear or extended) in smaller kivas versus larger organizational units in public structures where lineages, clans, or sodalities managed the events.

In summary, wall decorations in sites in Chaco Canyon exhibit considerable variability in decorative technique, design style, and location of wall decorations, as do those located throughout the Anasazi region during Pueblo II, Pueblo III, and Pueblo IV. Crotty (1995) observes a gradual change between the Pueblo III and Pueblo IV wall murals. By early Pueblo IV military or competitive scenes appear. Although the designs became more representative of life forms after the A.D. 1200s, considerable variability in style, technique, and subject matter led her to propose possible differences in social contexts or traditions, sometimes even within the same culture group. Subject matter also differed by area. Crotty (1995:374) concludes that the wall murals indicate a “mix of people with varied cultural traditions” and the presence of these murals seems to have occurred and “flourished where widespread contacts were maintained”. If the variability that is seen in Pueblo II and Pueblo III in Chaco Canyon represents similar diversity, then these earliest examples might indicate the presence of various traditions in the canyon, e.g., possibly extended families, clans, or sodalities that maintained relationships with groups from distant areas.
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This paper examines the relationship between imagery and space in Pueblo rock art sites, arguing that repetition and restriction were important means of creating sacred spaces. This power of place is particularly clear at Las Estrellas, a Pueblo rock art site in the northern Rio Grande area of New Mexico. The rock art at Las Estrellas includes numerous repeated images, many centered on conflict- and kachina-related themes. In concert with the site’s highly restricted layout, the rock art sends a clear message to visitors as they move from the site’s sole entrance to its core. Full of densely packed and often labor intensive rock art, the core area was the scene of intense, periodic activity, during which the images were worked and re-worked. As discussed below, Las Estrellas is a prime example in which secrecy, restricted access, and the production of rock art images intersect to create sacred space.

LAS ESTRELLAS

Las Estrellas is located in Bandelier National Monument at the southern edge of the Pajarito Plateau. The area has extensive evidence of occupation from the Coalition period (AD 1150-1325) through the Classic (AD 1325-1550) and into the historic period. Numerous field houses and a large plaza pueblo dating to the Classic period are located near Las Estrellas, and the area is rich in other rock art sites. This southern Pajarito rock art may have its origins in the Classic period, but the sites often contain imagery with historic subjects, perhaps even from the late nineteenth or early twentieth century (Munson 2002:280). The southern Pajarito is the traditional territory of the Keres Pueblos, who have ties to the large southern Classic sites (Harrington 1916).

Las Estrellas consists entirely of rock art on cliffs; there are no architectural remains and, except for a single rhyolite flake, the site completely lacks surface artifacts. The site was dated as part of the Pajarito Rock Art Project (PajRA) (Munson 2002), using a two-step process. First, standard methods of relative dating were used to identify rock art images that were directly associated with the primary occupations of each of the 32 rock art sites recorded by PajRA. These primary elements were then analyzed for temporally significant stylistic changes, using correspondence analysis, an exploratory multivariate statistical method (Munson 2002:117-125). The seriation created through correspondence analysis was then cross-checked using independently derived dates, based on ceramic assemblages, for 22 of the rock art sites. The results of the seriation document substantial change in the mode of representing human figures through time, from naturalistic depictions in the Coalition period to increasingly geometric figures in the Classic period. Historic figures, much like those of the Classic period in appearance, may sometimes be distinguished by their intricate detail (Munson 2002:126-140). These sweeping stylistic changes in human imagery provide the chronological information necessary to date previously undated rock art sites.
from the Pajarito Plateau, including Las Estrellas. A careful examination of the site's imagery reveals that some aspects of the rock art at this site resemble Classic Pajarito Plateau imagery. Human figures, for example, are shown with facial features such as eyes and/or mouths, as is common in the Classic (Munson 2002). Most of the humans are depicted in strict geometric shapes, such as flat-topped, square, or trapezoidal heads, hollow necks, and rectangular or square body shapes. In the most extreme form, human figures completely lack arms or legs. Several individuals have arcs at the base of the neck, as if a necklace were depicted; this is rare elsewhere on the Pajarito, although two sites in the area around the Classic pueblo of Tsankawi include figures with arcs or a chevron in the same position. Faces or masks at Las Estrellas are shown with the grimacing mouths and teeth common to Pueblo IV art (Crotty 1995:460; Schaafsma 1992:Figure 143), while images of people with striped necks are similar to rock art from the Classic period northern Pajarito site of Puye (Hewett 1938:Figures 62-63) and at Pottery Mound (Crotty 1995:434, 460).

Despite these similarities to Classic rock art, the imagery at Las Estrellas site far exceeds typical Classic imagery in its stylization, detail, and elaboration; in fact, I am only aware of a single other site with similarly elaborate imagery, located at the southern edge of the Pajarito "near Cochiti Pueblo" (Schaafsma 1980:Figure 234). At Las Estrellas, for example, a distinct individual with a pointed cap, claw-like hands, and ear bobs or an unusual hairstyle (Figure 1) is depicted almost a dozen times. This personage only appeared once in a sample of more than 2000 prehistoric Pajarito images (Munson 2002); a few other examples have been illustrated for other parts of the northern Rio Grande (Schaafsma 2000). A detailed depiction of a woman at Las Estrellas provides another example of the specificity of these images (Figure 2, upper right); she is shown with a square body, triangular head, and hollow neck with an arc at the base. Female genitalia are indicted by a bisected oval at the bottom of the torso. The figure wears a headdress of branching antlers and is rounded out with careful depiction of the thighs, calves, and heels; this attention to the lower limbs is rare on the Plateau, although it is also present in kiva murals at Pottery Mound (Crotty 1995:437ff) and at some northern Rio Grande rock art sites (e.g., Schaafsma 2000:Figure 2.31). Other human figures include kachina-like figures, such as a bird-headed individual with an elaborate headdress shown in profile (Figure 3, left) and an ovoid-headed figure that appears to be wearing a bucket-type mask (Figure 4, upper right). More identifiable kachina depictions include Shalako figures (Figure 5) and a possible mudhead. Several individuals at the site have distinctive hairstyles with historic parallels, such as butterfly hair whorls (Figures 2, 3, 6) or asymmetrical hairstyles (Figures 4, 6). Noses are often indicated by a short vertical line, a predominantly historic trait.

Although these images of ethnohistorically documented kachinas and hairstyles all have parallels
Figure 2
Rock art panel at Las Estrellas.

Figure 3
Rock art panel at Las Estrellas.
in Classic imagery from elsewhere in the northern Rio Grande, as in rock art at La Cieneguilla (Schaafsma 2000:135) or kiva murals at Pottery Mound (Crotty 1995:166-167), stylistic seriation and direct association with dated features on the Pajarito Plateau demonstrates that such images did not have a significant presence until the historic period. In fact, the imagery at Pajarito sites consistently blurs the line between the Classic period and the historic. At Las Estrellas, in particular, this fuzzy line between the Classic and the historic is abundantly clear. Some images, such as a Christian cross (Figure 3, lower right), are clearly historic, while others, such as a scratched image of a person (Figure 5), have parallels to historic rock art recorded elsewhere on the Pajarito Plateau.
(Chapman 1938). This scratched figure provides another important clue to the age of the site, as it underlies— and is therefore older than— a rectangular bodied mountain lion with knees. The lion resembles a Classic period painting from the pueblo of Otowi (Brody 1991:Figure 79), and the depiction of the thighs and calves is consistent with a late date. Other Pueblo IV parallels include the feather on the mountain lion’s head, much like an image from Cerro de Los Indios, a probable Pueblo IV site in the Tompiro district to the south (Brody 1991: plate 35). The superpositioning of the mountain lion over the historic etched figure indicates that both are more recent than the Classic, serving as a valuable reminder that Pajarito rock art did not change dramatically between the Classic period and more recent times.

THE PLACE

Despite its physical proximity to a plaza pueblo and numerous other rock art sites, the setting of Las Estrellas renders it isolated. It is not visible from neighboring sites or from the canyon bottom below; there is only a single location from which an individual outside the site can see it, and even if the rock art is noticed from outside, gaining access to the site itself is difficult. Las Estrellas is located at the junction of a sheer cliff and the top of a high talus slope. The configuration of the cliffs and talus slope only permits entrance from a single narrow arroyo, which provides access to the top of the talus slope through a broken section of the cliff. Nothing at this entrance hints of the site’s presence. Visitors must scramble along the base of the cliff for several dozen meters before reaching the first rock art panels. Beyond the initial rock art, additional panels are scattered along the cliff.

Eventually, about 170 meters from the first rock art, the upper cliff rounds a sharp corner to the core of the site, a small, slightly sloping platform, about three by four meters at its widest points. At the far side of the platform, the talus slope ends abruptly in a vertical cliff, which falls perhaps 50 meters to the valley bottom below. Nestled between the angle of the upper cliff and the sheer drop, this alcove provides a secluded platform for the central activities at Las Estrellas, as well as a stunning view out across the valley. As described below, the alcove is packed with heavily worked, large-scale rock art imagery. At the far end of the alcove, the upper and lower cliff converges, creat-
ing a narrow ledge about 1.5 meters wide that provides the sole access to several rock art panels. The ledge is narrow enough that it can be unnerving to traverse, but there is sufficient room for a single artist to work. It tapers out after about six meters, ending in a small sheer cliff face with additional rock art. One daredevil produced two images by leaning down and out from the ledge, over the 50 meter drop to the valley floor below. The setting of the alcove and ledge is visually stunning, an effect reinforced by the long approach, sheltered by the cliff face, followed by the sudden exposure of the open platform. The site’s layout seems designed to create a perfectly secluded space in an awe-inspiring location.

THE INTERSECTION OF IMAGE AND PLACE

The message of the site’s physical setting of the site is reinforced by the distribution of images throughout. The first five rock art panels are clustered at the natural entrance to the site, mostly in locations where they are sure to be seen. Oriented toward individuals entering the site, these panels center on a distinct suite of images, repeated numerous times. Four representations of a human figure in a pointed cap, often with claw-like hands (e.g., Figure 1), resemble historic accounts of the Twin War Gods (Schaafsma 2000). Likewise, three depictions of quadrupeds with long narrow bodies, short legs, and beak-like mouths (Figure 7) have historic parallels with rohona, a mythical creature associated with hunting in some Keres pueblos (White 1943). The rohona are accompanied by an image of Shalako, shown in profile with a feathered triangular body and a sharp beak. The redundancy of these repeated images at the entrance to the site seems designed to ensure that viewers receive a specific message upon arrival at the site.

As the viewer moves along the base of the cliff from west to east, the panels of rock art become increasingly complex, detailed, and crowded. The second major cluster of panels, located just a few meters after the first, consists of nine panels tightly clustered in an overhanging alcove in the cliff face. It includes an additional figure with a pointed cap and two images that either depict facial features on a headless torso or faces with arms and legs. There are several petroglyphs of several snakes and horned serpents, a thunderbird-type image, and several elements pecked across corners in the cliff face, giving them a three-dimensional quality. Much of the alcove is spotted or stained with faded paint, including several negative handprints made by blowing or spraying pigment around the hand. The horizontal overhanging ceiling of the alcove contains the most unusual feature of the site—the group of 34 painted X’s and dots in red, white, and black pigment that gives the site its name. Although such "star ceilings" are not infrequent in Navajo rock art in northwest New Mexico and Northern Arizona (Schaafsma 1980:322-323), they are rare in the eastern Pueblo area; as far as can be determined from published data, the stars at Las Estrellas, along with a star ceiling at San Cristobal, in the Galisteo Basin (Chamberlain and Schaafsma 1990), are the only such panels in the northern Rio Grande.

Beyond the alcove containing the star ceiling, the imagery continues to increase in complexity as one moves toward the most remote parts of the site. The elaborate historic mountain lion described earlier, for example, is shown with knees, curved calves, tapered thighs, and a distinct feather on its head (Figure 5). Its curved claws are carefully depicted, and its front paw is superimposed across the face of a large historic-style human figure. Other panels nearby show a possible mudhead and individuals with fully modeled thighs, knees, calves, and feet, in the historic style. The panel shown in Figure 3 includes a masked being in profile (left), humans with distinctive double-triangle hair whorls (center) and the detailed Christian cross (lower right) that serves as a clear indication that at least some of the site’s imagery is historic.
The core of the site lies around the corner from these penultimate panels. The vertical walls of the alcove are packed with intensively worked rock art, which extends onto outcropping bedrock at the base of the panels as well. The panels shown in Figure 2 are dominated by several large human figures, carefully depicted with precise lines and bold shapes. They are much larger in scale than typical Pajarito rock art; the figure with hair whorls and an X across the torso is a little over 1.8 meters in height. The central placement of these three impressive figures suggests that they were probably among the first images produced on the panel; they are surrounded by numerous smaller images. The smaller human figures are similar in form, although many are shown without legs, or lack limbs completely. Interspersed with these humans are several images of birds (Figure 2, lower left and upper right), as well as a beaked rohona-like quadruped with curved claws (Figure 2, upper center).

The other wall of the alcove is shown in Figure 4; located immediately to the right of the just-described panels, these images also cover the vertical cliff face and spill over onto bedrock outcrops at the base of the cliff. These images are slightly smaller in scale, without the bold central figures discussed above. Instead, the panels are densely packed with overlapping images of humans, geometric shapes, and patches of faded red pigment. Two figures in the upper right are shown with an asymmetrical hairstyle and a possible kachina mask; another in the center of the panel has horns and large eyes and mouth. A large circular object with internal lines (Figure 4, lower center) may represent a shield; an incomplete image of a mountain lion is located on bedrock at the base of the panel (Figure 4, lower right). The narrow ledge beyond the platform leads past several panels of similar human figures and geometric shapes. The rock art along this section of cliff makes constant use of the rock's contours; faces wrap around corners, and human figures are squeezed into available space on narrow boulders. The final panels, at the end of the ledge, include elaborate images of people with toothed mouths, pointed caps, decorated faces, and unusual hairstyles (Figure 6).

WORKING AND RE-WORKING IMAGES

Moving beyond the specific content of the images themselves, a consideration of technique and placement of the rock art at Las Estrellas suggests that the images were not only unusually labor intensive, but were produced and then re-worked over a period of time. Many of the images, for example, were made by combining multiple techniques, such as pecking and incising, within a single figure. Such combinations are rare on the Pajarito Plateau, where they constitute less than 3.5 percent of the images recorded by PajRA (Munson 2002); at Las Estrellas, eleven percent of the imagery (32 out of 281 elements) was made in this fashion, requiring more time and effort to produce than rock art that is simply pecked.

In a few cases, the surface of the cliff was ground prior to producing the rock art; although this was occasionally done in other parts of the Southwest to create a smoother surface for the rock art (see Brody 1991), such labor was unnecessary at Las Estrellas, where the tuff cliff is among the best natural surfaces for rock art on the Pajarito. Instead, the nature of the grinding suggests that it served as a means of re-working existing images. The large person with the torso X shown in Figure 2, for example, was pecked and incised, probably using a different tool for each technique; one of the legs was then heavily ground, producing a smooth, solidly worked area that contrasts greatly with the cliff background. Other figures were mostly pecked, with grinding later, as with three humans with grinding added at the sides of the face (Figure 6). In addition to requiring an additional tool, grinding steadily on the cliff's vertical surface would have been difficult work.

Pictographs are a similarly labor-intensive method of producing rock art, requiring the artist to
acquire and process pigments before producing the images. As is true of other Pajarito sites in the vicinity of Painted Cave, Las Estrellas has considerably more pictographs than most sites on the Pajarito Plateau. In fact, Las Estrellas alone has more elements with pigment \((n=101)\) than the other 31 PajRA sites combined \((n=69)\). Pigment was used to create the stars on the star ceiling, to make negative handprints, and to paint positive images. It also creates a light "wash" across much of the rock art shown in Figure 4, although it is not clear if the effect is original or a product of weathering. The red pigment used as Las Estrellas may have come from a source that is purportedly in the area (Harrington 1916:454), but the origins of the black and white pigments are unknown.

These labor intensive images were probably added to the site gradually, building up over time as new elements were added to old. The rock art panels at Las Estrellas are unusually crowded, and almost a fifth of the elements are superimposed on earlier images; other sites on the Pajarito, in contrast, seldom exceed 15-16% superpositioning. Superpositioning is particularly common within the core of the site, where most of the suitable cliff face is covered with images, which overlap so extensively that it is often difficult to distinguish discrete elements. These superpositions were often done without concern for the existing rock art; on one panel, for example, an armless human figure coincides with a series of small lizard-men and two carefully rendered humans (Figure 4, left center). Although it is not possible to determine which figures were created first, the presence of earlier images does not seem to have influenced the artists. The numerous small human figures and birds low on an adjacent panel show similar disregard for overlapping with existing images (Figure 2, lower left).

Some superpositions, however, have a more deliberate aspect. The mountain lion shown in Figure 5 provides a good example; its front paw, raised as if to strike, is superimposed across the face of a well-pecked human figure, partly destroying the person's face. The relationship of the lion to the person implicitly makes destruction part of the meaning of the image. In another case, the face of a human figure was completely obliterated by grinding (Figure 4, below right of horned figure). Less destructive re-working is visible in artists' use of multiple techniques, such as incising that was used to deepen and accentuate original pecked lines. In other cases, the artists created the original image anew, using parallel or overlapping lines. One human figure, for example, is both pecked and incised, with many angular, overlapping lines on its torso; the figure has multiple legs, four arms, and two heads (Figure 4, above left of cluster of dots). On close examination, it appears that an initial, relatively simple figure was outlined multiple times, resulting in a complicated double image.

The combination of different techniques, extensive superpositioning, and frequent re-working of images together suggest that the images at Las Estrellas were produced over a period of time. The rock art was not made in a single event, or, most likely, within a short time period. Instead, artists pecked images, then returned later to work them with different techniques, incising deeper lines or grinding portions of the cliff face. Some individuals collected and prepared pigments, creating new pictographs, or adding paint to existing images. Over time, the cliff faces at Las Estrellas became some of the most intensively worked rock art panels in the northern Rio Grande region.

RESTRICTED MOVEMENT AND SACRED SPACE

The imagery, layout, and physical setting of Las Estrellas come together to create a single coherent experience. Visitors are limited to individuals with knowledge of the site's specific location and its entrance. Upon entering the site, they encounter a set of specific images, posted where they are clearly visible. These initial images center on standardized representations of an individu-
ual with a pointed cap and claw-like hands; accompanied by rohona and a Shalako, the pointed-cap figures are repeated numerous times, emphasizing their presence and making certain that they are not overlooked. These initial images serve as a kind of introduction to the site, setting the stage for what is to come. In the process, they may help warn unsuitable visitors against proceeding farther. Individuals who do press on beyond the initial panels eventually round the corner to the site's core, the isolated platform perched dramatically above a sheer drop and surrounded by intense rock art.

The extreme visual and spatial isolation of this core provided an excellent location for private activities. Over time, artists and participants periodically gathered at Las Estrellas to work and rework the core panels, adding images and modifying existing rock art until the cliff face became one of the most intensely worked rock art sites in the northern Rio Grande. The small size of the platform— and the unnerving possibility of a fatal fall— would have strictly limited the number of participants; perhaps a half dozen people could safely move about the site's core. The stylistic continuity of the images within the site further suggests that the same artists may have returned to the site each time, perhaps as part of a yearly cycle of events.

The imagery that these artists produced has mixed connotations, combining aspects of Pueblo religious ceremonies and conflict-related imagery. Images of mudheads and other possible kachinas suggest supernatural beings, while depictions of elaborately adorned individuals wearing masks, headdresses, distinct hairstyles, and possible necklaces may reflect religious ceremonies. Although Las Estrellas generally lacks overtly conflict-related images like the shields, shield bearers, and weapons that are common elsewhere (Crotty 2001), much of its rock art has connotations of warfare or hunting in historic Pueblos. The horned figure with the large mouth and eyes and the individuals with grimacing, toothed mouths resemble descriptions of Masau, while the personage with the pointed cap is similar to the Twin War Gods. The X across the torsos of other figures is reminiscent of the okast, or bandoleer historically worn by men in warrior societies. The asymmetrical haircuts, short on one side and falling to the shoulder on the other, are similar to the "redlock" style worn by warriors in kiva murals (Crotty 1995). Depictions of Shalako, mountain lions, rohona, and stars also have connotations of warfare.

Though fully in the tradition of the rock art of the southern Pajarito Plateau, the imagery at Las Estrellas is far more elaborate than related rock art sites. Sheltered by the site's physical location and restricted layout, the site's core provided an open yet private location, dedicated to religious activities. The dense concentration of warlike and religious images was created and maintained by a small group of select individuals, perhaps members of a warrior society. Returning to the site year after year, these artists added rock art imagery to a physically impressive space, creating a place of enduring power.
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A POSSIBLE DARK AREA SHRINE IN CHAVEZ CAVE, DOÑA ANA COUNTY, NEW MEXICO

INTRODUCTION

Chavez Cave is located 12 km north of Las Cruces, New Mexico, and 300 m west of the Rio Grande floodplain. The cave is rather large, with a 43 m wide opening, a depth of up to 25 m, and a ceiling height of 6 m at center (Figure 1). It has been carved out of the Pleistocene Camp Rice Formation by waters draining from the nearby Robledo Mountains. The Camp Rice Formation in this locality features alternating horizontal beds of cobble conglomerate and sandstone. A layer of poorly cemented sandstone is where the cut was made into the formation. This sandstone layer varies from 50 to 90 cm in thickness at the rear of the cave, and there is one area behind boulders where the sandstone has weathered away and formed a low crawl space. Sand weathered from this layer makes up much of the fill in this cave, and large boulders from the overlying conglomerate are scattered in the center of the floor to the back wall and along the north wall.

Fires have blackened the ceiling of the cave, but six small pictographs can still be found on the roof. The largest is 50 by 25 cm and is a composite in red of straight, fenced or raked, and curved lines. The second is 17 cm high and is a possible stick figure in orange. Three others are made up of linear arrangements of three to eight dots, one with an adjoining circle and another with an open circle. The greatest dimension for any of these is 22 cm, and red, orange, and gray are the colors in these figures. The last one is a small, 7 cm, six-pointed star in red with an uncolored circle in the center. In general, these pictographs would appear to be Archaic in age (Bilbo and Sutherland 1986). The star may be the exception and could date to a more recent time period.

Harriet and Burton Cosgrove excavated most of the fill of this cave over a two-week period in
October of 1927 (Cosgrove 1947:31-33). They found a large number of artifacts, most of which they attributed to Basketmaker origin and others have since assigned to preceramic and early ceramic periods of the Jornada Mogollon (see Lehmer 1948; MacNeish 1989). These included an atlatl, dart foreshafts, throwing sticks, hinge-stick snares, fire drills and hearths, dibble or planting sticks, twined and coil-netted fiber and leather bags, netting, sandals of two and four-warp, wickerwork, fishtail and scuffer-toe construction, fragments of fur cloth or blankets, basketry of grass, bundle, half-rod, one-rod-and-bundle and two-rod-and-bundle foundation, tie-twined bundle matting, hair ornaments, shell jewelry, awls, woven fiber bands, and a variety of food remains that included corn cobs, fiber quids, squash rinds and animal bone. Although few items were quantified, the inventory would suggest habitation of this cave over a very long period of time.

In addition to the aforementioned artifacts, the Cosgroves unearthed a number of objects that they attributed to the Pueblo period or suggested could be of the Pueblo period. These included foreshafts and nock ends of compound arrows, a portion of a ring basket, fragments of undecorated pottery, two turtle shell rattles, reed cigarettes, painted peeled twig pahos or prayer sticks, unpeeled twig pahos, twig and round stick pahos with wrappings of fiber, cord and sinew, and cylindrical gaming or counting sticks. Aside from the rattles, counts were not given for these objects. However, the Cosgroves indicated that these objects were few in number but indicative of some use of the cave as a shrine (Cosgrove 1947: 32).

In the 1960s, a relic collector excavated around boulders along the north wall and found a cache of several baskets and a net. This person also found sandals, dart foreshafts, and a variety of other objects. These materials are now curated by the museum at New Mexico State University.

Most recently, Richard S. MacNeish (personal communication, 1993) tested Chavez Cave in several places. Unfortunately, he could not locate undisturbed deposits to pursue his studies of the Archaic and quickly abandoned work at the site.

Between these last two events, the writer had the opportunity to examine Chavez Cave. At the entrance and along the north wall, a number of artifacts were recovered from the piles of backdirt from previous excavations. These included sherds of Alma Plain and Scored and San Francisco Red that together date roughly at A.D. 500-900 (O'Laughlin 1985a). Contemporaneous or earlier objects were a dart foreshaft, a spear shaft fragment, a throwing stick fragment, wickerwork fishtail sandals, grass and bundle basketry fragments, a

![Figure 2](image-url)

Reed arrows, miniature arrow, and fishhook: a, nock end of arrow painted red (stippled) and green (solid); b-f, nock ends and fletched portions of arrows painted red (stippled) and black (solid); g, miniature, grass stem arrow; h, bone fishhook. Length of miniature arrow, 21.9 cm.
cord wrapped bundle of bark, a fragment of twined cloth, a fire drill and hearth, and a large bone fish-hook (Figure 2). The fishhook is the first reported for a prehistoric site in New Mexico. Contemporaneous or more recent objects included a functional bow fragment, fragments of composite arrows, a feather bundle, and six tablita fragments. The tablita fragments and feather bundle add to the ceremonial objects recovered by the Cosgroves and further intimate some use of the shelter as a shrine.

In addition to the superficial examination of the main cavern, the writer also undertook a limited investigation of a crawl space behind boulders at the rear of the cave. The results of this work follow and raise the possibility of the existence of a dark area shrine.

THE CRAWL SPACE

Near the back wall of the cave was a large boulder with mortar holes and other ground spots. Behind this boulder, there was a small shelf or alcove in the wall of the cave where the sandstone had been eroded away (Figure 1). On the north side of this shelf, and between the rear wall of the cave and the boulder, a mass of sticks, cactus spines, and droppings indicated considerable activity by woodrats. This woodrat nest obscured completely any evidence of a crawl space extending into the back wall of the cave. However, protruding from the nest was a number of perishable artifacts that prompted an investigation of the area. Portions of the nest were pulled apart to recover these items, but it quickly became apparent that other items were hidden within and beneath this nest. A systematic investigation was required.

A one-meter grid was established over the exposed nest and between the boulder and the cave wall. These squares were numbered sequentially with excavation, and the grid was expanded as excavation continued beneath the rear wall and into the crawl space. Once under the wall, dust masks and lanterns or flashlights were imperative, and the work was difficult and slow in the cramped space.

The height of the crawl space varied with the thickness of the sandstone stratum and rarely exceeded 80 cm in the area excavated. The ceiling was a cobble conglomerate, and the floor was either a remnant of the sandstone layer, conglomerate, or a loose fill of mixed sand and gravel. The woodrat nest occurred throughout the area excavated and ranged from a loose nest at the periphery to a compact mass of droppings and fewer sticks once under the rear wall. This layer was as thin as 15 cm to as thick as 45 cm and often filled the crawl space to the ceiling. The woodrat deposit, overlay a brown, fine sand with areas of decomposed plant material at the bottom. This layer was mostly 20 cm or less in thickness, with drifts on the north side to 30 cm.

At the west end of the excavation, Square 16, the woodrat nest gave way to a layer of light colored sand that had come from the sandstone stratum. It was here that the ceiling began to slope up and entry was gained to an inner room. This inner room had a dome-shaped ceiling that was fire blackened and approximately 60 cm above the top of the deposits. The visible portion of this room appeared to measure about 2 m by 3.5 m, and only the light colored sand could be seen throughout the room. As noted by Cosgrove (1947:31), the sandstone stratum is better characterized as hardened white sand, for it easily breaks off in blocks. Once entry was gained to the room, blocks gave way or the sand shifted and temporarily trapped the writer. It was deemed unadvisable to continue, and excavations ceased midway through Square 16.

Aside from the inner room, only two other features were noted (Figure 1). The first is an apparent pit with a dropseed grass liner. Lying on the grass liner were two unusual throwing sticks (Figure 3) and a fiber wrapped bundle of three reed cigarettes (filled with crushed plant material and stoppered with fiber balls). The throwing
sticks are similar to others of the region in that they have four incised lines on each face and pitched handles. They differ in being shorter and wider and having offset handles (Cosgrove 1947:58-60). In some respect they resemble historic Hopi rabbit sticks (Beaglehole 1936). The presence of two throwing sticks in perfect condition and the bundled cigarettes would suggest a possible offering, and it is noteworthy that Cosgrove (1947:60) reports a group of six equally unusual round, sinew wrapped throwing sticks, a twined-woven bag, and a coiled-netted bag behind the boulder marked with an “X” on Figure 1. The second feature is a lens of white ash just in front of the entrance to the inner room and correlated with the fire blackened ceiling and darkness of the area.

A range of objects was obtained from the lower layer of fine brown sand within the passageway. These included a questionable proximal end of an atlatl, a dart foreshaft, two fragments of grooved throwing sticks, 12 fragments of bundle and two-rod-and-bundle foundation basketry, portions of three two-warp, fishtail sandals, one four-warp sandal, four fire hearths, three fire drills, a slotted and yucca leaf-wrapped handle, a bundle of bark for basket making, three bone awls, an antler tine, gourd rind fragments, corn cobs, agave and sotol quids, fiber cordage, pieces of small and large mesh fiber netting, and three sherds of Alma Plain. The majority of specimens were incomplete, many were rodent gnawed, and some were partially burned. All of these specimens were found in Squares 3, 4, 5, and 6 where their condition and abundant cactus spines, gnawed sticks and yucca leaves, and rodent droppings indicated that they had been deposited by woodrats. Materials from this layer would appear to date no later than about A.D. 900.

Within and on top of the woodrat nest and at the top of the underlying layer was found a diverse array of objects that point to the probable presence of a shrine nearby. As with objects in the underlying sand layer, most of the items from the woodrat nest have been gnawed. Also, the majority of objects were retrieved from the nest in Squares 11, 12, 13, 14, and 16 at the entrance to the inner room. Three sherds of Alma Plain and one of San Francisco Red were recovered from this level. These sherds and the ceremonial objects would suggest that the nest dates to A.D. 500-900 or possibly later.

While many objects from the nest can be said to be ceremonial, others are either more utilitarian or have questionable status. Additionally, some of these objects may be older than the ceremonial objects. These include the distal half of a channel and spur atlatl, two pointed dart foreshafts, half of a throwing stick (decorated with the usual four incised lines and interrupted by an undecorated gap on one face and a series of five zigzag lines
across the opposite face), three small and unpeeled digging (?) sticks, a peeled digging stick/fire poker, five wooden fire hearths, five fire drills, a wooden trowel, a gourd vessel fragment showing repair, a piece of fiber-wrapped gourd, a short string of incised bone tube beads, a braided cord knot, small pieces of cordage, corn cobs, two cobs on sticks, a bone awl, one two-warp fishtail sandal, one four-warp sandal, two fragments of a plaited ring basket, one twilled sandal (Cosgrove 1947:87-88, Type 6), and one plaited sandal (Cosgrove 1947:89, Type 9). The fragments of the ring basket, the twilled sandal, and the plaited sandal may be of more recent age than the other objects. In particular, plaited sandals date generally to or after A.D. 500-700 (Martin et al. 1952:485).

Two nearly complete functional, compound arrows, seven nock ends, and six arrow foreshafts were found in the nest. All of the nock ends were decorated in black, red, and/or green and in one case black with specularite (Figure 2). Functional arrows and bows have been noted as common offerings in cave shrines of southern New Mexico (Cosgrove 1947:62-65; Ellis and Hammock 1968:26-29; Lambert and Ambler 1961:14-17), and their association with other ceremonial items would suggest that this is also the case at Chavez Cave.

Two other items from the woodrat nest and suspected as possible offerings are a miniature throwing stick and a potential crook-staff pahō. The miniature throwing stick is a round-handled, flat bladed and undecorated hardwood stick that is only 31 cm long. This object is half the size or less of full-sized throwing sticks (Cosgrove 1947:58-60,130); similar throwing sticks have been noted as possible offerings (Cosgrove 1947:130; Ellis and Hammock 1968:34). The possible crook-staff pahō is a peeled and polished stick of 37 cm, with a rounded distal end and a cut and roughly smoothed proximal end with a natural bend or crook. This specimen differs from most crook-staff pahos in that the proximal end has not been thinned to permit bending to form a crook, and the crook is more open (Cosgrove 1947:127). However, it is similar to one pictured from Feather Cave (Ellis and Hammock 1968: Figure 7a).

More definite ceremonial objects from the woodrat nest are a fragment of a gourd rattle, eight gaming or counting cylinders, a painted gourd disk, two grass stem pahos, a miniature arrow pahō, a twig pahō, four reed cigarettes, 15 tablita fragments, and a painted stone Tlaloc figure. With the exception of the painted gourd disk and the painted stone Tlaloc figure, these objects have equals with items from other ceremonial cave deposits of the region and are generally attributed to the Pueblo period. (for examples see: Cosgrove 1947; Ellis and Hammock 1968; Hough 1914). However, the evidence from Tularosa Cave indicates that the “Puebloan” constellation of ceremonial artifacts was first popular around A.D. 700-900, during the San Francisco phase of the Mogollon Pithouse period (Martin et al. 1952:483-507).

The rattle fragment is an unpainted piece of cultivated gourd rind with a portion of the orifice where the handle was inserted.

A native buffalo gourd section, 6.7-7.3 cm in diameter, was used as the base of a painted, raised disk (Figure 4). The outer edge of the disk is well smoothed, and there is a small perforation in the center. Four concentric rings of color are on the smooth, outer surface. From center out, they are black, green, yellowish brown (natural color of the buffalo gourd rind), and again black. No similar painted gourd object has been described for the Mogollon or Jornada regions.

The gaming or counting cylinders are portions of branches with rough-cut and broken ends. They measure 8.1-12.0 cm in length and 1.4-2.4 cm in diameter. One is well shaped, peeled and painted white. Another is peeled and scored with lines perpendicular to the long axis. Two cylinders are simply peeled, and the remaining four cylinders have the bark left in place.
The four pahos include an unpeeled twig paho bent back upon itself in crook-like fashion (see Cosgrove 1947: Figure 118k), two fiber-wrapped grass stem pahos, and a miniature arrow or grass stem paho. This last specimen is a 21.9 cm, with sinew wrappings at one end to hold two feathers (Figure 2). Miniature arrow or grass stem pahos frequently accompany miniature bows in cave offerings (see Cosgrove 1947:131-132).

Tablita fragments are thin boards of yucca and sotol stalks that are tied together with cords, sometimes glued together with pitch, and painted black, green and red. The manufacture of tablitas at Chavez Cave is indicated by a gourd rind palette with green paint and a piece of unpainted board used as a pitch dauber. One complete board, a nearly complete board, and a small intact element were recovered from the woodrat nest (Figure 4). However, the other pieces from the nest and the front of the cave are small, fragmentary or rodent gnawed pieces. Complete or nearly complete composite objects have been described as alter pieces, headdresses, and wands (Cosgrove 1947:132-134; Wasley 1962:387-388).

Finally, a small limestone spall with a likeness of Tlaloc painted on one face was found in Square 11 (Figure 5). This natural spall has a rectangular form with a square base and intentionally chipped and tapered top. It is triangular in cross-section, 8.9 cm long, 1.9 cm wide, and up to 1.6 cm thick. The black organic paint clearly defines two “goggle” eyes with dots in the center that characterize Tlaloc, a rain and ancestor worship deity with roots in Mesoamerica (Schaafsma 1994:66, 1999:168). Above the eyes, there is a framing line and then a solid black top. This black, tapering or terraced top may be cloud symbolism, often associated with Tlaloc rock art (Schaafsma 1999:175-184).

Below the eyes, the body is divided into a black half and a lighter stone colored half, with a cross line near the bottom. In difference to this figure, Tlaloc representations in rock art of the Jornada region frequently have a torso decorated with stepped motifs associated with rain (Schaafsma 1994:66, 1999:175-179). However, light/dark representations of Tlaloc are also known (Sutherland 1996:50). Additionally, two wooden Tlaloc figures from dark areas of U-Bar and
Stanton Caves are painted with darker and lighter halves like the figure from Chavez Cave (Lambert and Ambler 1961:77-78; Schaafsma 1999:180). Commenting on the figure from U-Bar Cave, Lambert and Ambler (1961:78) recount that “Western Pueblo friends recognized a duality in how the torso had been joined in two parts - 'twins' or 'Twin War Gods,' as they put it.” They also suggest that the figure is related to hunting and fertility rituals. Similarly, Sutherland (1996:50-52) sees Jornada Mogollon Tlalocs as derived from earlier Archaic depictions of hunters with trapezoid bodies. In particular, she notes horn-like projections on Archaic hunter figures and the occasional depiction of horns or other projections on later Tlaloc figures (see Sutherland 1996: Figure 21). A hunting shrine with many arrows was located near the ceremonial deposit with the proto-katchina or Tlaloc figure in U-Bar Cave (Lambert and Ambler 1961:14-17), and arrows occur at the entrance to the inner room at Chavez Cave. Thus, these Tlaloc figures may also be related to hunting activities, if only generally through notions of abundance, fertility and well being.

Tlaloc is associated with mountains, clouds, rain, springs, lakes, caves, the underworld, and ancestors (Schaafsma 1994:66, 168). It is probably no accident that the Tlaloc figures from U-Bar Cave, Stanton Cave, and now Chavez Cave come from dark areas of these caves that may have served as shipap representations of the spiritual connection between worlds (Ellis and Hammock 1968:30-33).

**DISCUSSION**

Caves throughout the Mogollon and Jornada Mogollon regions had special meaning to prehistoric peoples and very often served as shrines or repositories for ceremonial objects. Chavez Cave is clearly one of these caves.

Chavez Cave also gives evidence of habitation, probably intermittent and seasonal, over a long period of time. The inventory of objects reported by Cosgrove (1947:31-33) and reported here would leave little question on this inference. Archaic occupations are referenced principally by the occurrence of atlatls, spears, and dart foreshafts. Ceramics bespeak of occupation well into the Pithouse period. However, definite evidence of occupation during the Pueblo period is lacking.

Ceremonial activity is indicated by relatively few items from the main chamber of Chavez Cave. Cosgrove (1947:32) reports rattles, cigarettes, pahos, and gaming or counting cylinders. Tablita fragments and a feather bundle can now be added to this list.

At the rear of the cave and behind boulders are caches of unusual throwing sticks that may be of some special significance. The set of six sinew-wrapped sticks with two bags (Cosgrove 1947:60) may simply be a cache similar to that of baskets and a net along the east wall and reported here. However, these throwing sticks are unlike any
others from this region. Similarly, the pair of broad, short throwing sticks with angled handles from the grass-lined pit in the crawl space has no equal in the region. The presence of three reed cigarettes in this pit would add credence to the supposition that this feature may represent an offering.

A variety of ceremonial artifacts was recovered from a restricted and dark crawl space behind boulders at the rear of Chavez Cave and at the opening to an inner chamber. These included tablita fragments, pahos, reed cigarettes, gaming or counting cylinders, a miniature arrow, a gourd rattle, a painted gourd disk, and the painted stone Tlaloc figure. Parts of functional, compound arrows and a miniature throwing stick were associated with these objects and most probably were included as offerings. Questionably associated with these materials are more utilitarian objects and possibly older materials such as an atlatl fragment and dart foreshafts. Given that all of these objects were recovered from a woodrat nest, it is likely that objects of different time periods have been mixed. It is also possible that the inner or dark area chamber served as a shrine for a long period of time, perhaps beginning in the Archaic.

The inner, dark zone chamber is intriguing. Little more can be said than it is a chamber of unknown dimension and extent, with a smoke blackened ceiling and sands probably covering other perishable and ceremonial artifacts. Few dark zone shrines with perishable artifacts are known. The two best examples are Feather Cave (Ellis and Hammock 1968) and U-Bar Cave (Lambert and Ambler 1961) where shrines have been attributed to the Pueblo period and contain offerings comparable to those in the crawl space at the opening to the inner chamber of Chavez Cave. However, perishable artifacts from U-Bar Cave have been radiocarbon dated to the late Pithouse period (Harris 1985), and stratigraphic evidence from Tularosa Cave also suggests a "Puebloan" ritual complex emerging for the Mogollon during the Pithouse period, or about A.D. 700-900 (Martin et al. 1952:483-507). The presence of sherds of Alma Plain and Scored and San Francisco Red and the absence of painted wares at Chavez Cave could indicate that the ceremonial objects date to the period of about A.D. 700-900 (O'Laughlin 1985a).

Chavez Cave is located at the northern end of the Mesilla Valley. During the first part of the Pithouse period, ceramic assemblages in this valley are closely aligned with early Mogollon assemblages in the next valley to the north, the Rincon Valley (O'Laughlin 1985a, 1985b). Within the Mesilla Valley and during the second half of the Pithouse period, El Paso wares of the Jornada region replace the earlier ceramics (O'Laughlin 1985a). In the Rincon Valley, however, ceramics continue to follow those of the Mimbres Mogollon until the twelfth century (O'Laughlin 1985b). Changes in ceramic assemblages in the Mesilla Valley could be attributed to moving boundaries and populations. More importantly, changes in ceramic assemblages strengthen the argument that the pottery, associated ceremonial objects, and possible dark zone shrine at Chavez Cave could date to the Pithouse period and prior to about A.D. 900.

Additionally, the plaited and twilled sandals from the crawl space are types associated with the Mogollon proper and not the Jornada region of the Mogollon (Cosgrove 1947:92-98). Again, this would suggest that the late ceremonial materials are better placed with the earlier Pithouse period occupation of the valley.

Interest in the origins of the katchina cult has often directed attention toward the rock art of the Jornada region where precursors of kachinas and their associated iconography appear earlier than for the Anasazi. Schaafsma (1994:65) dates Jornada Tlaloc representations and kachina-like masks and figures as early as about A.D. 1000. Sutherland (1996:43) also cites two calibrated radiocarbon dates for Tlaloc pictographs at Hueco Tanks as A.D. 650-990 and A.D. 660-1020. Two
outline masks and a star motif have similar dates, while a streak and square/circle element were dated to the eleventh to fourteenth centuries. The radiocarbon dates for the Tlaloc pictographs correspond to the suggested date of A.D. 700-900 for the Tlaloc figure and other ceremonial materials from Chavez Cave. If the ceremonial materials associated with the dark zone chamber are accepted as dating to A.D. 700-900, then Chavez Cave would provide one of the earlier examples of an otherwise “Puebloan” shrine and one additional piece of evidence for the early appearance of Tlaloc iconography in the Jornada/Mimbres Mogollon region.

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From October, 1996, until the present, a number of observations have been made on and around two roughly circular rock structures on the edge of the Canadian escarpment east of Las Vegas, New Mexico. Archaeological and astronomical data indicate these structures, and accompanying rock alignments, may have had prehistoric ceremonial significance in connection with both the summer (June), and winter (December) solstices.

The Hondo Canyon Rock Structure Complex (LA 123171) consists of two low roughly-circular walled enclosures made of heaped-up sandstone blocks, a pair of upright standing stones, and one other potentially related stone alignment (Figure 1). All of these structures were built at approximately 6,400 ft above sea level, upon a ledge of Dakota sandstone (Figure 2). This ledge ends abruptly on the lip of a 15 m high cliff, on a northern tributary of the Conchas River. The doorways

Figure 1
Sketch map of structures, with solstice directions.
of both structures face roughly southwest. Both the standing stones and the doorways are aligned in such a way as to suggest they have astronomical functions.

Careful excavation of the thin soil within the circular structures has uncovered no diagnostic artifacts. A recent excavation of one quadrant in the larger structure failed to identify any sort of living level within that structure. This lack of artifacts or occupation detritus within the structures, along with the potential astronomical alignments and apparent lack of other logical purposes, would seem to support the assumption that they were primarily ceremonial in nature.

The absence of diagnostic artifacts, or datable organic material, leaves the matter of the structures' age in question. However, no ceramic sherds of any sort have been discovered within a half-mile circle of the site, indicating a possible pre-ceramic or late hunter-gatherer construction date. In addition, the coverage of the stones making up the structures with mature lichen, closely matching the lichen cover on the surrounding field stones, also suggests considerable age for the structures. This paper will discuss the foregoing assumptions, and the research supporting them.

SITE ENVIRONMENT

This site is located in a unique microclimate, which essentially follows the edges of the Canadian escarpment from just east of the Gallinas River canyon for nearly 200 miles to where it tails out near Ute Creek Mesa, north of Bueyeros, New Mexico. This microclimate, created by the more than 1,000 ft uplift of the escarpment, plus the water-conserving nature of the escarpment cliffs, consists of a fringe of moisture-seeking plants and trees lying between the high, dry plains of the Las Vegas plateau and the lower grasslands of the Conchas and Pecos river basins. Ponderosa pines, pinon pines, junipers and oaks edge the cliffs and choke the principally dry canyon bottoms. A mix of desert, plains and foothill plants, includes cholla and prickly pear cactus, yucca, mountain mahogany, sage, and various flowering plants. The ground cover is principally bunch grass and grama grass.

This 5-10 km wide zone is home to a variety of wildlife, including at least two species of rattlesnakes (diamondback and rock), whiptail lizards, kangaroo rats, wood rats (pack rats), chipmunks, ground squirrels and rabbits, both jack and cottontails. Among the larger animals are coyotes, kit foxes, mountain lions, bears, mule deer and elk, which, surprisingly, live in this narrow zone as if it were part of the mountains. Overhead, ravens, hawks and vultures ride the updrafts off the circuitous cliff edges.

The geologic platform for the Escarpment is provided by the cap rock of Cretaceous Dakota and Purgatoire sandstones. Some of these highly resistant, fine-grained rocks are hard enough to be
used as arrowheads, scrapers, hammer stones and other implements.

The softer Jurassic Morrison shales, and the Triassic Chinle shales and sandstones underlie the Dakota and Purgatoire. A hard, Chinle siltstone may be the source of the many worked siltstone fragments found scattered on surfaces near the site. However, these softer formations have caused huge blocks of stone to be undermined, then collapsed into the canyons below.

Immediately north of this narrow strip of vibrant life lie the high plains of the Las Vegas plateau. Also underlain by the resistant sandstone, these rolling grassy plains have little relief, and include many drainages without outlets, called "playas", which winter rains fill with seasonal ponds. It is highly probable that the builders of this sites' stone structures roamed and hunted these plains in summer, and repaired to the shelter of the escarpments' canyons during the winter months. Evidence suggests that the overhangs and benches beneath these cliffs may yield archaeological clues to this type of seasonal cultural pattern.

**HISTORY OF RESEARCH**

Discovered in 1996 by the author, the Hondo Canyon site was until then unknown to the current owners of the land, primarily due to its inaccessible location. An earlier owner, possibly an Hispanic pioneer, had harvested a mature Ponderosa, which had grown up through one of the stone structures at the site, leaving a 75 cm high stump, clearly cut by a hand-wielded saw. No other signs of modern man have been located at or near the site over five years of sporadic visits and research.

Many analogous rock structures have been investigated in northeastern New Mexico and southeastern Colorado over the last 70 years, beginning possibly with casual observations by W.C. Holden (Holden 1930). Dr. H. P. Mera speculated on the possible uses and dates of stone structures he observed in southern New Mexico in the Guadalupe mountains (Mera 1938). Perhaps the first in-depth study of these at-the-time mysterious structures was E.B. Renaud's doctoral thesis (Renaud 1942), in which he set out to ascertain the "origins, identity of [their] builders, time of use, purpose and function" of the "Indian Stone Enclosures of Colorado and New Mexico."

Although Renaud ranged over much of southeastern Colorado and northeastern New Mexico, his closest findings with respect to the present site were at Tecolote, 45 km west of Hondo Canyon. Here he found two enigmatic stone fences, and an assistant found several crude stone enclosures atop a nearby mesa. Renaud also cites Moorehead's observations (Moorehead 1938) of analogous circular structures near Mora, only 28 km to the north of Hondo Canyon, but provides no details about these structures.

Other structures were studied as far northwest as at Saguache, the San Luis valley, and the Cuchara districts of Colorado, and in the Dry Cimarron Valley/Chaquaqua plateau area along the Colorado-New Mexico border. Because most such structures were found atop isolated mesas or on canyon promontories, Renaud speculated that their principal purposes were as observation posts and defensive positions, with dwelling or ceremonial purposes as secondary possibilities.

R.G. Campbell, in his doctoral thesis (Campbell 1969, 1976), focused on the Chaquaqua Plateau, particularly along the Apishipa Canyon drainage, and developed the first chronology to elucidate the cultural developments in the region. He identifies the period from about A.D. 400 to 750 (Early Plains Woodland), as the time when the first stone structures were built. This period also coincided with the first use of cord-marked pottery, increased use of the bow and arrow, and the farming of maize in that region.

Campbell identifies sites with circular and rectangular living rooms with walls of two or three uncoursed rock tiers, and occasional vertical rock
slabs. Nearby middens denote longish periods of occupancy. Beginning in about A.D. 750, structures were built with vertical rock slab walls, protected by presumably defensive barrier walls, new pottery and projectile point styles were adopted, and valley horticulture was expanded. By around A.D. 1000, many cultural details added up to what Campbell named the Apishapa Focus of the Panhandle Aspect, referring to similar cultural developments already identified in the Panhandles of Texas and Oklahoma.

Several other archaeologists, among them Anderson (1975), Oakes (1979), Kingsbury and Nowak (1980), Nowak and Headington (1983), Winter (1988) and Gunnerson (1989), have studied the Apishapa and Dry Cimarron areas. Results of these studies generally confirmed the cultural aspects and time frames laid out by Campbell.

Perhaps the research most relevant to the present site from a geographical point of view is that conducted at Sitio Creston (LA 4939), located less than 40 km west of Hondo Canyon. Wiseman (1975) excavated eight rock enclosures perched atop a Mesozoic hogback capped by Dakota sandstone in advance of the construction of U.S. Interstate 25. These were generally analogous to the Hondo Canyon structures, except that none of them were as carefully constructed or as symmetrical as the larger of the two at Hondo Canyon. Wiseman attributes the Sitio structures to Campbell's Early Panhandle period (Campbell 1969), within the span of A.D. 1000 to 1150. He concludes that they were built as temporary living areas within a generalized base camp format, with additional possible functions as windbreaks, workshops and lookouts. Only one of the structures seemed to include a recognizable doorway.

Excavation in the structures uncovered artifacts that generally fit Campbell's Early Panhandle time frame, although corner-notched Scallorn-type projectile points predominated over Campbell's side-notched Washita and Reed points. Another difference identified a majority of Taos Plain and Taos Incised-style pottery fragments, as compared to a preponderance of cord-marked pottery in Campbell's scheme. Lack of maize kernels in the excavations, the presence of basin metates and one-hand manos and other factors, led Wiseman to conclude the occupants of the site were hunter-gatherers rather than the early horticulturalists of the Early Panhandle complex.

Geographic proximity, as well as roughly similar location and construction methods, would suggest that the Sitio Creston and Hondo Canyon sites were chronologically comparable. However, even though no diagnostic artifacts or datable organic materials, have been found at the Hondo Canyon site, there remains a total lack of ceramic materials in the area, leaving the question of its chronological position still moot.

In a recent paper, Wiseman (2001) discusses the stone enclosures of the Cielo complex in Trans-Pecos Texas (Mallouf 1999), and the Brantley Stone Enclosure site (Katz and Katz 1985) near Carlsbad, New Mexico. Though the structures described at the Brantley site have been dated at A.D. 750 to 1150, and revealed copious remnants of brownware pottery, the Katz's concluded, based on their stone artifact assemblages, that the structures were built by a hunting-gathering people, probably as summer hunting camps.

Conversely, Mallouf's Cielo sites are dated during the late prehistoric, early historic years (A.D. 1335-1650), are considered hunter-gatherer camps, and contain no pottery whatsoever! Both sets of researchers suspect these peoples had reverted, at some point, from an agriculture-based culture back to hunting-gathering.

Further documentary research uncovered only one regional rock structure site with a seemingly similar astronomical function, that of the oval rock enclosure at Casa Malpais Pueblo near Springerville, Arizona (Adams 1994). Though apparently incorporating solstice and equinox-related doorway alignments, this structure, dated
in the late Pueblo III period after A.D.1200, was built in ceramic and agricultural times, so is probably not chronologically analogous to the site discussed in this paper.

CURRENT RESEARCH

Initial research of the Hondo Canyon site by the author, beginning in 1996, consisted of photography, hand measurement, adjacent surface collection, orientation of structures by hand compass and clearance of a lightning- or wind-felled Ponderosa pine from the wall of one stone structure.

Second-phase research focused on the suggestive orientations of the circular structure’s doorways, as well as of the standing stones. This phase is covered in detail in the Site Function section of this paper.

A third research phase focused on controlled excavation of the circular structures’ interiors. After establishment of permanent datum points, five one-meter-square quadrants were excavated by trowel and brush, with all materials screened through a one-quarter inch screen. Only two worked stone fragments, and one possible fragment of a mano were found, none of them typologically diagnostic. During the most recent excavation in the larger structure, occupational detritus, such as charcoal, stained soil, bone fragments, kernels of grain or stone debitage, were found, further suggesting the structure was not a habitation.

Surface collection of artifacts in the surrounding area has located a scattering of projectile points, ranging in possible typology from En Medio to Scallorn to Harrell (Bell 1960) (Figure 3). Although such artifacts were found within 100 m of the site, they cannot be related directly to the structures.

An indisputable fact, again, is the conspicuous lack of observed ceramic fragments anywhere within the environs of the stone structures. If the builders of these structures were Plains Woodland-type hunter-gatherers, but had, for whatever reason, not begun using even imported pottery, then the structures might be dated anywhere between A.D. 450 and the early historic period (Wiseman 2001)!

THE ROCK STRUCTURE COMPLEX

The wall of the larger enclosure is made up of roughly-piled stones 60 to 75 cm in height above the exterior ground surface, 1 m in height above the interior floor and originally perhaps 1 m in width (Figure 4). The structure is oval in shape, oriented roughly north-northwest by south-southeast, is 7 m long and 5 m wide (outside measurements), with a 60 cm wide doorway piercing its southwesterly-facing wall. Close to nine tons of rock, as calculated on site, were arrayed in the larger structure in such a way as to orient its single doorway to the southwest.

Figure 3
Small artifacts found near structures.
The smaller and rounder structure is roughly circular and 2.75 m in diameter (Figure 5). Its walls are made of larger stone blocks, loosely piled, some of which have been tumbled aside by an unknown agency. It too has a southwest-facing doorway. A Ponderosa pine tree, now a weathered stump, grew up between and squeezed apart two large stones in the structure's southeasterly wall. Since the stones forming the wall opposite the tree have been shoved aside from their assumed original circular aspect, it can be postulated that they were knocked aside when the tree fell westward after it was cut in pioneer times.

The doorways of both structures are identified by their lichen-covered doorsteps and both lead onto a jumbled ledge formation terminating at the nearby cliff's edge. The doorway of the larger structure may have been framed with two long and narrow rocks found adjacent to the opening, but this section of the structure wall was literally flattened by a large lightning- or wind-toppled Ponderosa pine.

No discernable special wall or interior features were noted in either structure during initial surveys or excavation.

Apparently associated with and located approximately 9 m southeast of the larger structure, are two upright stones, each 1 m in height and standing 1.5 m apart (Figure 6). These stones are aligned one to the other on an azimuth approximating East 120 degrees South and West 298 degrees North. When first discovered, these stones were tipped at roughly 45 degrees from the vertical, but were obviously not originally in that configuration. Around the base of each were several smaller rocks, clearly arrayed as supports for a vertical configuration. When raised to vertical, and braced by the smaller rocks, it was noted that their alignment was as mentioned above.

As a part of our study, we re-erected these stones (Figure 7). While minor variation in their orientation might have occurred at this time, this vari-
atation could not have been more than one or two
degrees in any direction, and the alignments
remain significant. However, since the standing
stones picturesquely frame the southerly view of
the valley of the Rio Hondo, it was at first specu­
lated they might have had some kind of ceremo­
nial function relating to the large game animals
which could have migrated up the canyon in pre­
historic times.

As mentioned above, the upper surfaces
of all the rocks used in the structures are
lichen covered to an extent almost exactly the same as the surrounding field rocks. This avenue for chronologi­
cal research has not been explored, since no certain baseline site has been
located from which lichen growth para­
meters could be established.

Apparently supporting this concept, there is on
the cliff edge approximately 2 m to the south, a
spear-point shaped stone pointing straight down
canyon (Figure 8). This stone was clearly placed
in this location, and was not weathered in situ out
of the surrounding ledges. What its function actu­
ally was can only be a matter for speculation.

Figure 6
Standing stones as discovered.

Figure 7
Standing stones as re-erected.

Figure 8
Spear-shaped stone points down valley.
SITE FUNCTION

Among the functions suggested for the rock enclosures have been as corrals for modern animals, residences for early man, fortifications, lookout stations and some sort of ceremonial activity. The first can be ruled out immediately; even the least agile sheep, goat, burro or cow could scramble over these walls, and no sign of animal droppings has been found within either walled structure.

Had these structures been residential in nature, some manner of living level containing daily human detritus like charcoal, ceramic sherds, stone debitage, bone or ash, would likely have been uncovered. None has, to date.

Considered as fortifications, these structures don't work; their location with their entrances facing southwest to a 15 m cliff, with a world of flat prairies, with minimal cover, in the opposite direction, rules out this use. As lookouts, someone in the structures, if covered (see below), could not even have seen over the cliff edge into the canyon below. In addition, all of the cliff edges in view of this structure have been surveyed, and no similar structures of any kind have been located, to or from which signals might have been made. It is also unlikely that anyone would move nearly nine tons of rock so that the two doorways would, by chance, serve an astronomical function (see below).

This leaves one speculating about the ceremonial function. As mentioned above, second-phase research focused on the suggestive orientations of the circular structure's doorways, as well as of the standing stones. A visit to the site on the winter solstice (December 21, 1997) confirmed that the two structure doorways almost exactly frame the sun at sunset (Figures 9, 10). Or conversely, the setting sun would illuminate the interiors, were the structures covered, as was the case at Maes Howe in the Orkneys (Hedges 1984). A hand-held compass caught

Figure 9
Winter solstice sunset through entrance of larger structure.

Figure 10
Winter solstice sunset through entrance of smaller structure.
the sunset at South 244 degrees West through the doorway of the small structure, and 242 degrees through the large circle's opening. An optimal reading at winter solstice for the site's latitude and longitude would be South 240 degrees West (Smart 1980), though the mountain horizon to the west of the site could significantly alter this reading. Both readings were taken from the midpoint of the northeast wall of each structure.

On June 21, 1998, the author observed sunset over the northwest bearing of the two standing stones (Figure 11). Although somewhat obscured by a Ponderosa pine, the sun apparently set at West 296 degrees North, just two degrees off the alignment of the standing stones, and four degrees off an optimal reading of 300 degrees for solstice sunset at that latitude and longitude (Smart 1980). Again, the mountain horizon, as well as the reorientation of the stones, and the screening effect of the ponderosa, could effect these readings. Subsequent visits have confirmed this alignment.

On December 21, 1998, fair weather permitted a test of the winter solstice sunrise alignment of the standing stones. At sunrise, on an azimuth of East 120 degrees South, the sun rose over the near horizon precisely in line with the southeast bearing of the standing stones (Figure 12). This phenomenon has also been subsequently confirmed.

Possibly coincidentally, there is a clearly man-made stack of large, flat rocks located northeast of the standing stones and the structures, topped by a 1 m long rock lying on its side. If the long stone were erected vertically in situ, it would be approximately on an azimuth of North 60 degrees East from a point just northwest of the northwest standing stone, and would effectively mark, from that point, the summer solstice sunrise. Whether this potential alignment was intended by the stone structure builders can never be known.
CONCLUSIONS

If one grants the alignments cited above, then one must explain the uses of the structures as they relate to the alignments. Did ancient Americans visit this site at appropriate times to hold ceremonies to celebrate the summer and winter solstices? This seems to be the only remaining explanation for the structures' orientations and locations.

One reason for the original choice of site was obviously the availability of stones for building. Another might have been, if one assumes smaller and lower trees and brush were growing at that time, a clear view of all horizons. As residential structures, the two stone enclosures could not be in a poorer location. They are built on jagged ledge rock, fully exposed to some of the strongest winds this researcher has experienced in New Mexico. Relatively soft prairie-soil-covered terrain, ideal for wickiup foundations or pithouses, is abundant just 100 m to the north, and sheltered caves and benches lie below the cliffs. Water was probably available in the now-intermittent stream in the canyon below.

However, as suggested by Gunnerson at his Canterbury site (Gunnerson 1989), one can imagine a temporary roof framework of branches or small trees, braced within the structures' rocks and covered with hides, providing a crude shelter for persons involved in seasonal solstice ceremonies.

If, except for a few nights, these people did not live in the structures, where did they live? Recent discovery of several rock shelters, and a possible camp site (LA 135370) in the nearby canyon hold promise that this may be answered with further research.

Today, watching the winter solstice sun setting in the structures' doorways, or the summer solstice sun setting over the northwest bearing of the standing stones, suggests a prehistoric connection with the timeless phenomenon of the sun wheeling through its annual cycles. However, as W. James Judge (1983) demands, anyone researching such phenomena must attempt "to interpret the purpose and function of these phenomena [within] a larger social context."

From Judge's point of view, it is next to impossible to put one's self in the moccasins of a hunting-gathering tribe of pre-ceramic nomads and understand the importance that the winter and summer solstices had to them. These calendric moments probably had no agricultural relevancy to such a people, as they did to later prehistoric farmers. But, to hunters and gatherers, the winter solstice could have denoted the turning northward of the sun into the spring season. And the summer solstice could have forecast the several upcoming moon cycles of productive hunting and gathering still to come in late summer and fall.

Many prehistoric and primitive peoples have celebrated or made ceremonial note of the solstices. A hunting-gathering people in the northern Rockies, noting that the winter solstice sun penetrated deep into a south-west facing cave, carved a significant petroglyph on the sunset-facing wall of the cave (Connor, personal communication, 2003). As recently as the last years of the nineteenth century, Hopi secret societies joined in a major winter solstice celebration, the Soyaluna, which included hunting, warrior, and agricultural elements ( Fewkes 1898).

In his fascinating book about pre-Bronze age stone structures in the Orkney Islands north of Scotland, John Hedges comments on the presumed ceremonies that might have been connected with these structures. Regarding communal rituals: "Whatever a ceremony is about it reinforces the social structure, providing a focus of attention for the group involved and giving it identity and unity." (Hedges 1984).

For whatever reasons, then, the solstices might have been celebrated at the Hondo Canyon Structure Complex, just as they have been celebrated by other peoples throughout history, and into pre-history, as demonstrated by a myriad of solstice-related ceremonies and structures around the world.
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Very few prehistoric fabrics have survived from the Southwestern United States, let alone entire garments, for even though it is classified as a desert, the alternating cold winters and hot, wet summers have not aided preservation as has the constant dry heat of coastal Peru for ancient textiles there. There are a number of survivals found in the inner rooms of cliff dwellings or caves where they were protected from the elements (Kent 1983:15). The more open and exposed sites of the Hohokam region has meant virtually no textiles are extant (Kent 1983:16). Sandals may be the most common item of clothing to have survived. Early Basketmaker examples of footwear show the classic stepped interlocking pattern common on Anasazi baskets and pottery. In the Southwest basketry is an older art than pottery and such angular designs were adapted to the crossing of warp and weft rather than to the more fluid art of painting on ceramics.

A man’s spectacular cotton poncho or shirt from Tonto National Monument in the Salado area of Arizona is a rare and fortunate survival and is one of the few complete garments discovered, with the exception of feather and fur blankets (see Kent 1983:Figure34; Teague 1998:cover). It was found in Tonto Cave by amateur archaeologists, so the date is not certain although the upper part of the site has been dated from the late twelfth to the late fifteenth century (Teague 1998:80). The shirt is woven without a loom in either the interlace technique (Kent 1983:66) or more likely sprang (Teague 1998:81).

[Sprang is a Scandinavian word in general use for this technique in which parallel thread are fixed to a bar at either end and interlaced at one end resulting in a reverse pattern at the other (see Teague 1998:109, Figures 4-8).] The shirt is comparable in style to twentieth century crocheted shirts made at San Juan Pueblo also in cotton (Figure 1). On the modern shirt the symbolism is that of zigzags representing lightning and the fringe falling rain. These two shirts illustrate an important point in Pueblo culture.

Figure 1
Cotton shirt, crochet
San Juan Pueblo. Photo courtesy of Maxwell Museum, University of New Mexico.
and that is continuity over long periods of time. The prehistoric shirt is woven in an intricate technique while the modern example is crocheted, a simpler and faster technique introduced by the Spanish, but providing a similar visual effect.

Enough textile fragments have survived to give insights into ancient textile techniques, materials, colors and design layouts, but not on costumes. Fortunately, there is another record of the apparel of Pueblo people in the late prehistoric period known as Pueblo IV (1300-1600). This record is the painted walls of kivas at four sites: Awatovi and Kawai'a on Hopi ancestral lands in Arizona; Pottery Mound on the Rio Grande thirty miles south of Albuquerque; and Kuaua on the Rio Grande just north of Albuquerque at the junction of the Jemez and Rio Grande. The sites all date to the end of the Pueblo IV period, the fifteenth and sixteenth centuries. Apparently both Pottery Mound and Kuaua were abandoned before the Spanish entrada, but Awatovi was destroyed by other Hopi villages around 1701. Kuaua, also known as Coronado State Monument, was at one time thought to be the village where Coronado and his soldiers spent of the winter of 1540.

While there was only one painted kiva at Kuaua, the two Hopi area sites had 22 kivas. There were 16 kivas at Pottery Mound. The buildings, all square or western Anasazi type, had numerous layers of paint separated by white plaster. It is unknown what the time periods were between layers, but if modern practice is an example then the paintings were covered up after use in a ceremony. The figures represented are probably not ordinary mortals, but supernatural beings, gods or even ordinary people dressed as gods. Therefore, how much of the clothing represents what Pueblo people were wearing? We do know by analogy with nineteenth and twentieth century photographs that the costumes worn by both men and women in dances were similar to those evidenced in the murals and worn in everyday life.

The basic garment for men is a single piece kilt wrapped around the hips and secured at the waist by a belt or sash. Even in antiquity there are differences in the style of these garments between ancient Pueblos indicating that the variations in style that we see in modern Pueblo costumes had their roots in antiquity with a marked difference between the Rio Grande area and the western of Hopi region of Pueblo culture. Men's kilts are shown the same way in both regions, but the manner of decoration is different in each area. At Hopi they are also invariably white with dec-
oration around the lower border or hem (Figure 2) while at Pottery Mound the kilts are black, either plain or with an all over decorations (Figure 3). The modern dance kilt is usually white with embroidered decoration, not along the hem, but along the short edges where they are lapped. When, where and why this change in style from bottom decorated to end decorated kilt came about is not known, but as late as 1852, Richard Kern, artist for the Sitgreaves Expedition, drew male dances at Zuni with the ancient style of hem decorated kilt (Sitgreaves 1853). The all over decorations of kilts has survived on some garments, generally cotton canvas with serpents painted on and used in the Rio Grande Buffalo and Hopi Snake dances as well as on the Rattlesnake katsina. Although white kilts are most common today, the plain black or dark blue garments are still worn by some katsina figures especially Hopi and Zuni Mudheads (called Koyemsi at Zuni) and the Hopi Mad or Stone Eater katsina.

There are differences in the ways sashes are shown between East and West with those at Pottery Mound having simple tassels while those at Awatovi have very complex multiple tassels. The two types of belts that have survived are the narrow woven belt and the wide white rain sash woven in the sprang technique (see Figure 3). The spheres are made on a ring of corn husk representing the clouds that bring rain to the corn, and the long streamers are the rain. The use of this technique is quite rare today and has been replaced by warp face weave. The contemporary rain sash seems to be identical to the ancient ones. These rain sashes are painted by the artists in both regions spread out next to the figure in order to display its beauty and intricacy. The narrow red and green warp float belt shown on many male figures is perhaps the most ubiquitous of modern Pueblo textiles and is still made and used today by dancers and a popular tourist item.

The modern kilt (Figure 4) is always worn lapped on the right side. Lucy Lowden of Jemez Pueblo is about the only woman who weaves her own base cloth for kilts which she then embroiders. She says, “There is a break in the embroidery halfway down, like the spirit trail on a pottery vessel. The kilt pattern represents rain falling from a cloud. The black is South, earth rain and clouds; the green is the West, natural resources, youth and strength. The four bars along the bottom stand for the four seasons.” (personal communication, February 15, 1996). A kilt is not finished unless it has black braid along the bottom hem and the ideal is thirteen strands, braided by hand. Black binding tape is not acceptable.

Women's dresses or mantas at Pottery Mound are worn tied or sewn over the right shoulder and down the side and belted at the waist (Figure 5). This is the style still found in nineteenth and twentieth century dance costumes. While mantas
today can be either black or white, black mantas being wool and white ones cotton, we see no white ones in the Pottery Mound murals. Nor is there any representation of the white cotton and wool maiden’s manta with red and green or red and blue borders commonly worn at Hopi until the early twentieth century. The western Pueblos of Acoma and Laguna were known for their elaborately embroidered black wool mantas in the nineteenth century, a style which H. P. Mera (1975:18) believes originated there. Religious officials at Acoma were called in to interpret the kiva murals at Pottery Mound by the excavator, Frank Hibben, because he felt they were the modern descendants of the mural painters. Perhaps the western Pueblo manta with or without embroidery, is a survival of the Pottery Mound tradition. Ancient black mantas would have to have been dyed or painted cotton or yucca since wool was introduced by the Spanish. The majority of mantas at Pottery Mound are covered with large, bold designs of giant hooks and zigzags (see Figure 5). Many of the patterns have black dots in the center and this has led some scholars (Kent 1983:195; Teague 1998:135) to suggest that they are decorated by means of tie dye which
is the gathering of a section of the woven cloth into a circle which is bound with thread and then dyed leaving the bound area colorless and the surrounding cloth an center of the circle dyed. A small number of tie dyed fragments have survived, but none from Pottery Mound (Kent 1983:194). The designs could also be a woven openwork, painted or perhaps even embroidered. The textiles at Pottery Mound are the most beautiful of any of the sites; however, there are no surviving pieces, only loom parts and post holes for looms to indicate they were woven there. The large polychrome designs on kilts and mantas are very likely painted rather than woven based on the complexity of the curvilinear patterns. There are many more female figures at Pottery Mound than male; one of them shows women holding baskets in a row on all four walls. Another impressive painting covers all the walls with mantas folded over a hanging bar just as they are in a modern Pueblo home.

At Awatovi, however, the style of wrapping the manta is much different—they are sewn on both shoulders and belted in the breast area, a style which has not survived (Figure 6). Mantas are both black and white. These two figures are about the only identifiable women shown in the paintings. One black and white manta appears tie dyed and many have been traded from the Rio Grande, but it is worn in the Awatovi style up over both shoulders. Not to neglect the costumes of men and women at Kuaua we must note that the few representations there show extremely plain black mantas and kilts decorated with only simple sashes. Some kilts at Awatovi have narrow red geometric ornamentations along the bottom edge that resembles decoration on contemporary mantas. Could this be embroidery as it is in the modern mantas? Decoration on mantas today is usually confined to the top and bottom edges with small areas of decoration along the shorter ends and not the flamboyant all-over patterns seen at Pottery Mound. We know that embroidery was not an introduced technique, but is at least late prehistoric, so this is possible (Teague 1998:140). From the bits and pieces of fabric that have survived from antiquity the Pueblo people practiced many different loom techniques that were replaced after the Spanish conquest with faster methods of ornamentation such as embroidery and applique for painting and weaving, crochet for netting and knitting for weaving. While the ancient embroidery stitch was the simple running or hem stitch, the Pueblo backstitch used to cover large areas with pattern is probably a variation of the Spanish colcha stitch. Today very few kilts or mantas are hand woven, but woven on commerc-

Figure 6
Awatovi mural fragment showing woman with tie dye manta, Cat. No. 529-RW3A 01/045. Photo courtesy of Peabody Museum, Harvard University.
cial cloth in wool and cotton chosen to provide the same visual effect. Tewa Weavers, an Albuquerque based company produced treadle loom woven mantas but the firm is now out of business. A white cotton commercial fabric which is fairly coarse and hence easy to embroider, called monks cloth, is purchased in a store in Bernalillo.

Spanish explorers considered the Pueblos more “civilized” than other tribes because they lived in villages, farmed and also wore woven clothing, just like Europeans. Spanish reports also indicated some regional variations in dress. Don Juan Onate stated that Indians dressed in cotton or agave blankets, black or white and well decorated (Hammond and Rey 1953:483). Don Francisco de Valverde reported that the women wore some short cotton blankets reaching below the knee and tied around the waist by a cotton sash and said, “They wear another blanket as a sort of tilma, thrown loosely over the shoulder and tied at both ends. The blankets which they wear on the outside often contain rough designs resembling grotesque masks without actually having the shape of the face.” (Hammond and Rey 1953:645). Juan Rodriques said, “Women wear painted heavy cotton blankets, most of them two, one as a sort of petticoat or skirt and another wrapped around the body.” (Hammond and Rey 1953:862). This would be a different costume entirely or perhaps the outer blanket or tilma was very large and wrapped tightly over the manta.

Although the dress of the Pueblos was modest it became more so after Spanish settlement. Men wore Mexican Indian style cropped white cotton pants with slits on the sides and cotton shirts, a costume that is still worn by the chorus that accompanies dancers at Rio Grande Pueblos today. It is a truism that in a traditional society men more quickly adopt the dress of the dominant society than the women. Men are the intermediaries with the conquerors and the women stay in the homes and maintain traditional ways. To their traditional manta women added petticoats, simple cotton underdresses, and blouses (Figure 7). Until around World War II, Pueblo women wore this combination, a black wool manta over the cotton dress in the winter and a cotton manta over it in the summer. There are many old photos of women dressed in this way as they go about

Figure 7
Group of Santa Clara Indians, late nineteenth century(?). Men are wearing clothing heavily influenced by the Plains. The women wear traditional mantas with heavy embroidery. Young girl second from left appears to be wearing a white Hopi style maiden’s manta. Photo courtesy of Colorado Historical Society.
their daily work making pottery, and hoeing their gardens (Figure 8). Nowadays, this is a special feast day outfit or made for girls for their high school graduation. Back aprons are worn with the feast day dresses and mantas at some Pueblos but not all. They are usually a light material such as rayon patterned with brightly colored flowers and a lace or ribbon border. It is roughly the size of an apron but the fastener is a continuous ribbon which can be slipped over the head leaving the cloth is hand down the back. A conventional apron is also worn with the back apron or pitone (Figure 8). This feature does not appear in the kiva murals and may be an addition brought to New Mexico by the Spanish perhaps in the costumes of the matachine dance or perhaps priests vestments. Matilda Coxe Stevenson (1904:371) when describing Zuni dress states, “The woman whose husband or father has brought her a shawl of foreign manufacture from Santa Fe or Albuquerque, which on state occasions she wears as an extra pi'toni, for the cotton one is never laid aside except for ceremonials, is envied by the other women.” In 1936 Alice Stallings reports that “The women of both Pueblos (Zia and Jemez) drop the square of cloth down their back although Zia women dispense with it for daily wear. The Jemez women think this is extremely immodest and say they would be ‘ashamed’ to appear without his part of their costume.” (Stallings 1936:48). Since the back apron does not cover any unprotected part of a woman’s anatomy, there must be some important symbolism attached to it. Conventional aprons are also worn over the dress and manta usually beautifully embroidered in cross stitch. These aprons and the cross stitch technique are a EuroAmerican introduction probably through home economics classes at school. The modern feast day calico dress is designed with ornamentation at the neck, shoulders, cuffs and hem so that the apron would not cover up any major designs.

Although female figures in the kiva murals have only ritual headdresses, in the real world of intense sunshine and cold it was necessary to wear a second manta over the head and shoulders. In the twentieth century this gave way to commercial shawls, especially those made in Eastern Europe (Czechoslovakia) and now Russia. Fine wool Pendleton shawls are also used as outer wraps and head coverings but they are thick and heavy and rather expensive. The scarves from Eastern Europe are light, colorful and less costly.

Figure 8
Julian and Maria Martinez of San Ildefonso Pueblo making pottery. Maria is wearing a summer cotton manta and cotton underdress as well as a back apron.
Photo N-275 courtesy of Denver Public Library.
In 1936 Alice Stallings wrote an article on "Indian Dress" for New Mexico Magazine. This is one of the earliest observations of village differences in costume. She noted, "The familiar design of the old-fashioned, bodiced, flannel nightgown is worn by nearly every Pueblo woman, in calico, under her traditional shoulder dress-long sleeves and high neck the year around. Yards and Yards and Yards of petticoats are worn by all Indian women." (Stallings 1936:19). Stallings notes differences in hair styles and moccasins from village to village as well. Acoma dresses use a great deal of embroidery and allow four inches of heavily embroidered petticoat to show at the hem of the black dress (Figure 9). Red and white cotton garments were prevalent at Isleta and the men there wore white open work shirts over red cotton undershirts, the drawn work allowing them to show through. Back aprons were worn at Zuni, Zia, Jemez and San Ildefonso. There was a distinction between northern and southern Rio Grande Pueblos. Southern Pueblo women allowed their petticoats to show and wore aprons, but beginning at Santo Domingo on the middle Rio Grande there were no more aprons. At Tesuque women preferred calico checked shoulder dress and there was a difference between young and old women as regard to the neckline. The young women wore an open collar, but older women wore straight band with a ruffle. Jemez women were known for their finely checked and cross stitch aprons. The women of San Ildefonso referred to the men’s white open work shirts over red cotton undershirts as 'undergarments'.

*Figure 9*
Two women at Laguna or Acoma wearing wool mantas over cotton underdress, flowered head scarves and women on left wears apron, nineteenth century. Note lace petticoats. Photo courtesy of Colorado Historical Society.

*Figure 10*
Par-Ben-Nah, Taos Pueblo Woman, early twentieth century (?). She is wearing the simple plain manta and black shawl typical of Taos. Photo H-486 courtesy of Denver Public Library.
liked patterns with bold stripes. Santa Clara dresses were a plain under blouse and a patterned cotton overdress or vice versa, but never were both pieces made with patterns as were those of the other Pueblos. At San Juan the women preferred head shawls to reach to the hem of their dresses and favored patterned dark blue calico dresses with red bands at the wrist with distinctive standup pleated collars. Taos women were noted for their plain black shawls and open throated, short sleeved dresses often made of silk (Figure 10).

Until the Second World War, Pueblo women wore traditional clothing, but nowadays it is only worn for ceremonial occasions and except for those actually participating in the dances it is steadily being abandoned. The war was an important factor for change in the Pueblos as men and women experienced more of the outside world and wanted changes. Perhaps television and tourism today is more of a force for change in dress. Some dancers wear dresses fashioned from Guatemalan prints, perhaps noticed first in the folk art stores in Santa Fe and Albuquerque. When one attends a Pueblo dance the long rows of men and women are still dressed in the ancient manner although there may be some shortcuts such as applique instead of embroidered designs. Regional variations first observed in the kiva murals continue until the present time, however with addition after addition from European cultures, such as the back apron underdress, blouses, head scarves, petticoats and aprons. Now we are into the twenty-first century and the basic styles shown in the kiva murals have survived, but for how long? More work needs to be done to document individual village variations in the feast day dress before they disappear.

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Rabbits and hares are common little creatures in New Mexico and, indeed, throughout most of the world. They are found in arid deserts and alpine snowfields and have been the bane of many an urban gardener. Now often relegated to cartoon characters in our society, they once formed an important element of diet and clothing for many Americans both native and immigrant. So it appears to have been for the Ancestral Navajos, or Diné, who inhabited the Largo - Gobernador Canyon area known to them as Dinétah. Therefore it is perhaps not surprising that the animal is occasionally portrayed in the rock art of the area.

Although common in the environment and in the lives of the Native Americans of the Southwest, rabbit images in rock art are not often encountered. Overviews such as done by Cole (1990), Schaafsma (1975, 1980, 1992), and Slifer (1998) indicate that portrayals of birds, reptiles, and large game animals such as bighorn sheep, deer, elk and antelope appear much more often than the lowly rabbit. Thus mostly ignored by the rock artists, a study of rabbit themes in petroglyphs and pictographs has not previously been carried out.

The geographic boundaries of Dinétah have been described in an earlier paper (Rogers 2002) and will not be repeated here. The images were probably placed on the rock during the Gobernador Phase, a period of roughly A.D. 1635 to about 1765. This was a time of great change for the Navajo inhabitants of Dinétah. The Spanish entrance into New Mexico with their horses, sheep and metal, Native American alterations in theology, and the introduction of new blood through marriage and raiding led to the creation of the Navajo Nation as we now know it today.

The continuity of tradition between the Diné and the Navajo People of the twenty first century allows Navajos of today to view the rock art of their ancestors and recognize many of the symbols found there. This provides the student of rock art a unique opportunity to identify and perhaps understand these images. Through oral history and ethnological records made over the last 125 years, much information can be obtained when this rock art is considered as artifact.

The authors fully realize the biological differences between rabbits and hares, but it would appear that the Navajos did not. The Navajo word for rabbit is gah, with galthbai or gray rabbit for the cottontail, and gahtsoh or big rabbit for jackrabbits (Young and Morgan 1980:978). As the distinction between rabbits and hares is also difficult to determine from the rock art, rabbit will be the term used in this paper.

**RABBITS ON THE GROUND AND ON THE ROCK**

Images of rabbits are unusual in Dinétah rock art just as they are elsewhere in the Southwest but, when found, are realistically done and clearly represent the animal (Figures 1-3). Rabbits are also rare in Navajo ceremonial art as reflected in
recorded dry paintings. Reichard (1977:28, Plate 1) illustrates a sand painting from Bead Chant that includes a rabbit but notes that it symbolizes only the food the Holy Person used on his quest. Perhaps the use of a rabbit image as a symbol of food, particularly small game animal food, is, for the Navajo, its most important aspect. This would elevate the rabbit from lowly to high status.

Rabbit materials also play only a small part in the assemblage of equipment for medicine bundles. Kluckhohn and Wyman (1940:33) note that in Water Way and Wind Way the whistle used should be the femur of a jackrabbit. The Franciscan Fathers (1968:511) record that the whistle used in Bead Chant should be made from the femur of a jackrabbit killed by an eagle. Other than these scant references, the voluminous anthropological literature makes little mention of rabbits in ceremony. Rabbits, however, do play a role in some of the many Coyote Tales and so have a part in Navajo folklore.

The rabbit is presently not considered a “sacred” animal and no ritual is required in hunting it as there is for deer, elk, antelope and some others. Two methods of hunting rabbits have been recorded: individual and group. With the individual method the hunter works alone and takes the animal by shot, club or whatever means available; in days of yore, this is how young boys achieved skill with the bow and arrow. This method is most applicable for taking cottontails, for that animal tends to remain close to its burrow and remain still in the face of danger.

Group hunting was the method most often used for hunting jackrabbits. The jackrabbit ranges widely in open sagebrush flats and flees promptly at the hint of danger. An area supporting many jackrabbits would be surrounded by hunters, who then tightened the circle, clubbing or shooting the animals as they were forced into a smaller area. Newcomb (1966:228-232) observed such a hunt in 1925 and these group activities are still done on occasion as social events.

Because the rabbit is a pedestrian animal playing little role in ceremony and requiring no ritual in hunting, it is perhaps surprising that it is present in rock art imagery at all. As noted above, when it is depicted, it is realistically portrayed and, most often, in life-size proportions (Figures 1-3). Present day Navajo ceremonialists and other students of their own lore who have viewed these images suggest that the rabbit represents all small
game and these icons were placed on the rock with prayers to insure an abundance of these essential creatures. Again we see the importance of the rabbit image as a symbol of sustenance.

One can identify images in rock art study but interpretation is hazardous. Hunting methods, for instance, cannot be determined from the rock art evidence based on present knowledge. An arrow has pierced the rabbit image in Figure 1 but that does not necessarily indicate the use of the bow. Instead, it may simply symbolize the desired result of a planned hunt or be a metaphor for a successful hunt once concluded. As Schaafsma (Muench and Schaafsma 1995:16) has so succinctly written, "...rock art is an artifact of ideas...," and to try to guess the ideas of the eighteenth century artists we leave to others of more imaginative bent.

**RABBIT TRACKS ON THE GROUND AND ON THE ROCK**

Animal tracks of various types are common in the Navajo era rock art of the Largo-Gobernador area and many of the game animals are represented. Most of these track images are well done and the animal can often easily be identified. Antelope, deer, elk, bison, feline and canine prints are clearly represented, and rabbit tracks are common (Rogers 2001).

The rabbit's usual gait is the hop and this is accomplished in a rather unique way. The motion is begun by a launch from the rear feet and the front paws strike the ground one in front of the other. The animal then pivots over the front feet with the hind feet striking the ground parallel to one another and in front of the forefeet, ready to repeat the procedure. These leave a distinctive Y pattern in snow or soft sand familiar to most outdoors people of today. This pattern of four dots or pits is also found in rock art.

Trackway is a term our paleontological colleagues use to describe two or more petrified footprints made by the same animal and seems quite adaptable to petroglyphs and pictographs. Rabbit trackways sometimes lead across the rock to the portrayal of the animal and this is the case in Figure 4. Rabbit trackways are also found without an image of the animal and these are more common than the rabbit glyphs themselves. These may extend across the rock for several meters and may end at cracks in, or corners of, the cliff face (Figure 5).
The symbolic purpose of these trackways is unknown. Present day Navajo observers can offer only guesses and they are not found in recorded dry paintings. Animal tracks in current Navajo ceremonialism are simplistically said only to represent the animal itself, but why would some trackways lead to one image of the animal and not others. In time and effort, it would seem as easy to create the petroglyph of a rabbit as it would to create a trackway several meters long. Rabbit and other trackways remain as enigmatic as the other rock art images of Dinétah.

RABBIT TRACKS ON THE ROCK AND IN THE SKY

Tozzer (1908) was the first to report Navajo star lore and symbolism, noting constellation imagery portrayed as drill holes in gourd rattles used in the Nightway ritual. Father Berard Haile collected astronomical information from his many Navajo informants and first noted the constellation Rabbit Track (Haile 1975). Krupp (1994) has also published valuable information on the Navajo Rabbit Track. Griffin-Pierce (1992) has published a definitive study of Navajo astronomical knowledge including the Rabbit Track constellation. Her work revealed the important concept of the Rabbit Track Constellation as the “hunter’s guide” for the Navajo, thus linking these stars with the rabbit image as a symbol of animal food source.

Chamberlain (1983) was the first to recognize Navajo constellation patterns in a Navajo era rock art panel in Dinétah, and Pleiades, Orion and Rabbit Track were identified. Since then, numerous other rock art sites with astronomical symbolism have been recognized (Chamberlain and Rogers 2001, 2003).

The Navajo Rabbit Track is a group of four stars in the now familiar Y pattern that makes up a part of our constellation Scorpius. The Navajo divide Scorpius into two constellations; the head and body are part of a constellation they call First Big

Figure 5

LA 57096, San Juan County, New Mexico.
Rabbit trackway arching over other glyphs and ending in natural crack in cliff face.

One and the stars in the tail, or stinger, are Rabbit Track. The Navajo words are Gah heet’e’ii, which may be more formally translated than ‘rabbit track’. Gah is the noun for rabbit, as already noted; heet’e’ii denotes the hopping motion. Therefore, Gah heet’e’ii indicates the path of a rabbit, a place where a rabbit once hopped.

Navajos use their constellations to mark the seasons and the time for certain activities such as planting, harvesting and hunting. Rabbit Track begins its heliacal rise in February, first appearing in the predawn darkness during that month. It then rises earlier and earlier until it is prominent in the evening sky of summer. Finally, it disappears in the sunset of October. This disappearance marks the beginning of the hunting season for big game such as deer, elk, and antelope as noted by Newcomb (1966:227-228) and was the
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There are eight major constellations recognized by the Navajo and thirty-some minor ones. Seven of the eight majors have been found in Dinétah rock art and at least one of the minors. Rabbit Track is one of the majors and one of the most commonly portrayed constellations in petroglyphs, along with the Pleiades and the belt and sword of Orion (Figure 7). These asterisms are usually carefully made, and drilled holes are more commonly used than a pecking technique. No pictograph of Rabbit Track or any other constellation has been located.

One must be careful in identifying Rabbit Track as a constellation pattern as opposed to the rabbit trackway that may denote the animal. Only when the characteristic Y pattern is found in conjunction with other readily identifiable sky symbols such as star icons, the Pleiades or Big Dipper can such recognition be made with reasonable certainty.

Figure 6
Unrecorded site, Rio Arriba County, New Mexico.
Plus sign and Y pattern of rabbit track formed with glyphs of cat tracks.

cause for celebration and the rabbit hunt that she witnessed in 1925. This hunting season then ended with the reappearance of the constellation in February, while the hunting of small game continued. While Navajo Department of Game and Fish now determine hunting seasons, many older Navajos remember the traditional ways.

One Dinétah petroglyph panel nicely reveals the significance of the Rabbit Track Constellation, the hunter's guide, and its associated rock art depiction. Figure 6 shows the Y pattern of the familiar rabbit track with each of the prints being that of the paw prints of a cat, nature's uniquely qualified hunter. A plus sign, a typical Navajo symbol for a star, suggests that this unique little panel does indeed depict Gah heet'e'ii, the Hunter's guide. How could anyone familiar with Navajo concepts have said it better?

Figure 7
LA 57096, San Juan County, New Mexico.
Constellation patterns: six pits representing the belt and sword of Orion, upper right and upper center right; seven pits representing the Pleiades, center; and four pits representing rabbit track, lower right.
The authors urge interested observers of rock art in New Mexico to be alert for such patterns, as they may well be found in the imagery of other cultures. Stevenson (1905:444-445) collected a sandstone boulder near Zuni Pueblo that is now in the collection of the United States National Museum. On that slab are dot patterns identical to those found in Dinétah, including the Y pattern. Stevenson's Zuni informants identified several of these as star patterns and noted Ursa Major and the Pleiades. Other Puebloan sites might well include similar images.

Rabbits are frequently portrayed as designs on Mimbres pottery vessels and Thompson (2000) has noted the similarity of some of these zoomorphs to the image of "the rabbit in the moon". The "rabbit in the moon" is as commonly known in various cultures as the "man in the moon" is in ours. Because of its distinct posture, with vertically oriented body and ears and tail pointing to the right, the rabbit/moon relationship may be suggested. No such orientation is known for Navajo era rabbit petroglyphs but this observation should be kept in mind when viewing rock art not only in the Largo – Gobernador area but elsewhere.

CONCLUSIONS

Rabbit iconography is significant in the Largo – Gobernador Canyon country because of its relationship to hunting practices and because of its archeoastronomical implications as well. The cultural continuity between the Dinésazi who made these images and the Dine of today make the study of Navajo era rock art especially meaningful. Even the examination of such seemingly insignificant zoomorphs as the rabbit can lead to greater understanding of the lives of people of the past.

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ROCK ART, KACHINAS, AND THE LANDSCAPE
AT CERRO INDIIO, NEW MEXICO

The Piro Pueblo site of Cerro Indio, located on San Acacia Butte in central New Mexico, is a powerful and unique place that has thus far received little academic attention. The occupants of Cerro Indio lived along the border zone of two major prehistoric cultural groups (Figure 1), the Pueblo and the Jornada Mogollon, at a time of mass migrations and significant change for the people of the American Southwest. They chose a place positioned high above the valley floor where the landscape could be surveyed with sweeping vistas in all directions. The rock art they carefully created to encircle their pueblo drew in the world around them, which served as the vital force behind the beings it depicted. Distant landforms, migrating animals, seasonal phenomena, and natural rock formations were used to enhance pecked and painted depictions of supernatural kachinas and other elements of the surrounding landscape. In the following pages I will discuss the relationship of rock art, kachinas, and the landscape at Cerro Indio by providing an introduction to important terms and relevant background including the Pueblo and Jornada rock art traditions, which provided the foundation for rock art production at Cerro Indio. This paper will also examine the physical and cultural landscape of Cerro Indio, its kachinas and other rock art, and the dynamic interrelations of these features.

Figure 1
Distribution of Kachinas in Rock Art, Kiva Murals, and Pottery (adapted from Adams, 1991).
TERMINOLOGY

Before an in-depth discussion regarding rock art, kachinas, and the landscape at Cerro Indio can begin, a number of terms and their usage in this paper must be clarified. First, usage of the term rock art will be briefly addressed. Second, the various kachina concepts and their manifestation in the rock art record will be introduced. Third, an explanation of the landscape-based approach will be offered.

In essence, the term rock art refers to images created upon rock surfaces in a natural setting in the form of petroglyphs and pictographs. Petroglyphs, the most common form of rock art among the Rio Grande Pueblos, are images created by means of pecking, abrading, incising, scraping, or scratching. Pictographs often occur under rock overhangs and are painted with natural pigments. Usage of the term rock art, although commonly accepted, may have various implications beyond those described above and is often coupled with debate. The term rock art, as applied in this paper, refers to a form of human expression with dynamic purpose and meaning that appears on rock surfaces in the landscape.

Kachina (also spelled katchina, katcina, and katsina) is another concept that requires some discussion and clarification. The kachina movement is a complex socio-religious pan-Pueblo phenomenon that manifests itself differently from community to community. It promoted harmony and the integration of the larger pueblo settlements, is associated with fertility and rain, and in many pueblos is also connected with the spirits of the ancestors (Adams, 1991). The word kachina, borrowed from the Hopi, is associated with three interrelated concepts—the doll, the dancer, and the deity—and have been discussed at length by numerous authors over the years (e.g., Brody 1994; Bunzel 1932; Colton 1959; Dozier 1970; Eggan 1994; Fewkes 1903; Ladd 1994). The mask associated with all three forms is not simply a facial covering or disguise; it is a living being with the power to transform the dancer into the kachina it resembles. The spirit of the kachina and the man are essentially joined when the mask is worn. The man as kachina is then able to carry prayers to the appropriate god.

Representational forms of kachinas appear frequently at rock art sites across the Greater Pueblo Province of New Mexico and Arizona and may have served a variety of functions. Images associated with the kachina movement can be found in the general archaeological record in the upper Rio Grande Valley, the upper and middle Little Colorado River Valleys, the Hopi Mesa region, the Mogollon Rim, and in rare instances in the Verde Valley (see Figure 1). Similar mask-like images are also found in the Jornada rock art of the middle Rio Grande Valley but may not be part of the kachina movement. Kachinas emerge (or become recognizable as such) in Eastern Pueblo rock art, kiva murals, and pottery before Spanish contact, early in the Pueblo IV Period (1300-1600 AD) (Schaaflsma 1992a). Kachinas may be in the form of a dancer depicting the entire body with clothing and adornments or, conversely, representations may be only the head, face, or mask image. These latter depictions, described by Schaaflsma (1980) as masks, are the focus of this paper. Given that little, if any, distinction can be made between the deity and the mask, the mask-like images studied will be referred to as kachinas in this text.

Landscape was defined in the early part of the twentieth century by geographer Carl Sauer as “an area made up of a distinct association of forms, both physical and cultural” (1925:321). A landscape-based approach focuses on the interrelation of the physical and cultural layers of a space. Rock art is a unique form of human expression in that it represents a total integration of these landscapes. In most cases, rock art is found in the place where it was created, on the surface of the landscape. As Sauer pointed out, “the objects which exist together in the landscape exist in interrela-
tion...they constitute a reality as a whole that is not expressed by a consideration of the constituent parts separately..." (1925:321). As such, rock art images must be viewed not only as individual forms, but also as part of a system of features that make up a particular space. As noted landscape essayist J.B. Jackson (1980) observes, an emphasis on the usage of space by the local community has several advantages; it facilitates identification of the occupant, identification of the neighboring groups, and identification of that group’s cultural values.

A focus on landscape is particularly useful when dealing with the Pueblos because of each community’s intimate relationship with the land and its resources. As Anschuetz and Scheick (2000:2.6) point out, landscape plays a central role in all aspects of Pueblo life and “has come to occupy a revered place in community cosmologies.” Because this paper involves a Pueblo landscape, it is of great import to adapt traditional academic views of landscape by integrating aspects of the Pueblo worldview. The Pueblo landscape perspective is not limited to what the eye can see; it incorporates all that can be perceived including the thoughts and feelings of those who enter or have entered the landscape (Anschuetz and Scheick 2000). This idea is elaborated upon by Leslie Marmon Silko, who explains that “Pueblo [people]..., the creators of petroglyphs and oral narratives, never conceived of removing themselves from the earth and the sky. So long as the human consciousness remains within the hills, canyons, cliffs, and the plants, clouds, and sky, the term landscape as it has entered the English language, is misleading” (1986:84, emphasis in original). For the purposes of this paper, the traditional notion of landscape, as described above, will be expanded to reflect Pueblo landscape concepts. Therefore, the term landscape will be used in this text to refer to an area made up of a dynamic association of forms that includes surfacial features (such as, landforms, water sources, rock art images, and dwellings) as well as Pueblo thought and being.

ROCK ART AND KACHINAS OF THE EASTERN PUEBLO PROVINCE

The majority of rock art found within the Rio Grande Valley and Eastern Mountains between Taos and San Marcial is believed to have been produced during the Pueblo IV Period (A.D. 1300 to 1600) and is commonly referred to as the Rio Grande Style. The early Pueblo IV Period marked the rise of representational forms and new horizons in all forms of art as Pueblo People and their southern neighbors, the Jornada Mogollon, began to migrate and exchange ideas on a larger scale. The region as a whole is noted for its great quantity of images, (some sites contain thousands of figures) as well as diverse subject matter and innovative forms. It remains unclear whether this increase in complex and diverse figures is due to a more important role of rock art production or is simply a result of the new aggregated settlement pattern. Significant creativity in form is evident through the rare occurrence of duplication (Schaafsma 1992a). Subject matter includes large decorative shields and shield bearers, terraced designs, four-pointed stars, quadrupeds, birds, insects, snakes, horned serpents, and various anthropomorphs including the continuing tradition of the humpbacked flute player. Human figures, or anthropomorphs, tend to be depicted frontally with boxy torsos, legs bent at the knee, and large feet facing the same direction. Special attention was given to heads, which are often depicted with detailed facial features, particularly in the southern and eastern areas. Kachina mask forms are perhaps the most diagnostic trait within the Rio Grande Style and display enormous variety across the Eastern Pueblo Province.

Despite underlying similarities that unite this artistic tradition, spatial variations in rock art occur as one moves through the cultural and physical subdivisions of the Eastern Pueblo Province. As a hallmark figure of the Rio Grande Style,
kachinas serve as an indicator of regional variations. Rock art north of White Rock Canyon (Los Alamos) among Northern Tiwa and Northern Tewa settlements is characterized by the near absence of kachina masks, while shields are the dominant feature. Further south in the Albuquerque Basin, Eastern Keres and Southern Tiwa kachinas become a defining element but are simpler in design compared to those found in other areas. Southern Tewa sites of the Galisteo Basin are characterized by their large quantity of war-related imagery such as large decorated shields, stars, and eagles as well as an abundance of horned serpents, and kachinas (particularly warrior kachinas) (Schaafsma 1992b). Bold outlines and facial features distinguish kachinas found at sites in this region. Southern rock art sites near the Jornada/Pueblo transition zone are known for their diverse element inventory including large numbers of kachinas, which are highly varied and detailed. Located along this transition zone, Cerro Indio exhibits an astounding array of kachina masks unmatched by any other Pueblo site. East of the Manzano Mountains, rock art associated with the Tompiro and Eastern Tiwa is also recognized for its abundance of kachina masks with fine detail, many of which are painted in various colors.

Rock art images relating to this ideographic system were strongly developed among the southern and eastern Pueblos, suggesting that this socioreligious phenomenon once played a significantly more important role among these groups than is indicated today. (Note the abandonment of the Southern Tewa, Eastern Tiwa, Tompiro, and Piro pueblos after the Pueblo Revolt and a comparatively minor role of kachina ceremonies among modern Southern Tiwa communities.) Although no consensus has been reached regarding the relationship between the Jornada and Pueblo groups, Schaafsma (1994) suggests that the proliferation of kachina masks in the southern and eastern areas (and their existence throughout the Pueblo region) is due to Pueblo acceptance of ideologies from the Jornada culture with which the southern and eastern Pueblos were spatially and temporally contiguous. While some degree of influence seems likely due to obvious similarities in particular images, more research is needed in order to determine the extent of Pueblo/Mogollon relationships.

ROCK ART AND THE MASKING TRADITION OF THE JORNADA MOGOLLON

The Mogollon were another prehistoric farming culture who made their homes across the northern stretches of the Chihuahuan Desert in the modern-day regions of southeastern Arizona, southern New Mexico, and adjacent areas of Texas and Mexico. According to Schaafsma, the rock art in this region displays such great variability both temporally and geographically that “no single description will circumscribe what is meant by Mogollon” (1980:183). This vast region is divided into the western Mountain and eastern Desert Mogollon branches, with different rock art styles described for each group (Schaafsma 1980). For the purposes of this paper, only the Desert Mogollon and the affiliated Jornada Style (approximately A.D. 1050 to AD 1400) of rock art in southern New Mexico will be discussed due to their likely relationship with the site of Cerro Indio.

The Jornada Style is characterized by several elements with an emphasis on masks and ceremonial figures. Formal qualities of the Jornada Style include the usage of an entire rock face for a single composition; bilateral symmetry; continuous line composition often incorporating life forms; animals with internal geometric patterns, bent legs, and nucleated circles as eyes; human figures depicted frontally with feet turned outward; and stylized human faces or masks, described in detail below (Crotty 1990). Common elements include large blanket designs, horned serpents, birds, spread-winged eagles, turtles, fish, insects, tadpoles, corn, terraces, rainbows, and stylized
quadrupeds. As noted by Schaafsma, east of the Rio Grande Valley in southern New Mexico “masks and ceremonial figures are among the most diagnostic and striking designs here. They are highly individual and diversified, no two figures being exactly alike” (1980:203). Although masks in this region “exhibit a bewildering number of attributes” (Schaafsma 1980:210), characteristics which typify masks in the Jornada region can be identified. Such characteristics include rounded or flat-topped outlines, occasional ears or earrings, and depiction of eyes, nose, and mouth. Eyes are typically shown as almond shaped, although some are square or round. A central dot or line is usually added to depict pupils and eyebrows are common. Noses tend to be triangular in shape, placed high on the face, and are sometimes a linear extension of the eyebrows. Mouths, headresses, and facial decoration are highly varied (Schaafsma 1980). Frequent variations in mask design include those without an outline and those incorporating rock corners for a three-dimensional effect. According to Schaafsma, “from an aesthetic point of view, some of the finest designs in the entire style are the mask paintings in the rock shelters at Hueco Tanks” (1980:201). The abundance of greatly varied and colorful Jornada masks found at Hueco Tanks have been thoroughly documented, described, and illustrated by Kirkland and Newcomb (1967). Some masks found at Hueco Tanks and at other sites across the Jornada region bear a striking resemblance to Pueblo kachina masks, particularly in the Mogollon-Pueblo transition areas, such as Cerro Indio. Much debate exists as to whether these images indicate a continuing artistic tradition or expressions associated with distinct socio-religious phenomena.

Aside from masks, the Jornada Style exhibits another ceremonial figure, which may be considered the “hallmark” (Schaafsma 1980) or “quintessential Jornada image” (Crotty 1990). This figure, variably referred to as a “blanket kachina” (Davis and Toness 1974), “kachina blanket” (Wellmann 1979), “bug-eyed kachina” (Steed 1979), “classic Tlaloc” (Schaafsma 1980), and “goggle-eyed figure” (Crotty 1990), is represented at nearly every Jornada site (Schaafsma 1980). The most prominent attribute is the pair of large round eyes staring from a flat-topped head. The body is trapezoidal shaped with geometric designs. Schaafsma (1999) confirms the presence of this image in southern New Mexico by A.D. 1000-1150 through its depiction on a Mimbres black-on-white bowl. It is important to note that the associations of this image with Pueblo kachinas or the Mesoamerican rain god Tlaloc also remain speculative and highly debated.

THE SITE OF CERRO INDIO

The Cerro Indio site (LA 287) of Rio Abajo is located on a privately owned basalt butte along the western bank of the Rio Grande about 35 miles north of Socorro, New Mexico (Figure 1). A Pueblo IV settlement atop the butte is encircled by elaborately designed petroglyphs along the crest of the butte and is afforded a commanding view of the surrounding area. Several small pictograph shelters with fine-line paintings are also found on the slopes of the butte. A smaller companion Piro settlement and rock art site, known as San Acacia (LA 1999), is situated across the river. Despite a bulldozed road on the western slope and a quarry area at the base of the eastern slope, the rock art appears to be in good condition. The site is recognized for its abundance of kachinas, many of which are highly stylized and carefully executed.

There is a notable paucity of published research pertaining to the Cerro Indio petroglyphs and pictographs. The Rio Abajo archaeological survey conducted by Marshall and Walt (1984) provides the most complete site analysis to date. However, the time-consuming task of rock art recording was not the primary objective of that survey. Consequently, the petroglyphs are only briefly addressed. Schaafsma (1992, 1994) has discussed the Cerro Indio petroglyphs, particularly the masks, as an extension of Jornada culture by not-
ing stylistic similarities among images in both regions. Like the Rio Abajo survey, some documentation is provided, but no comprehensive survey has yet been undertaken. Due to the absence of thorough documentation, this author conducted a partial survey for the purpose of a larger research project (Saville 2001).

The Cerro Indio landscape includes a variety of important features that undoubtedly influenced settlement patterns and rock art production. The site is located on a basaltic andesite outcrop well into the Mexican Highlands Section of the Basin and Range Province at the eastern periphery of the Datil-Mogollon volcanic field (Weber 1963) and the southwestern end of the Albuquerque Basin. The flow that created the butte was created from locally derived materials during the early Pliocene (4.5 mya) and is interbedded with the Sierra Ladrones Formation of the Santa Fe Group (Machette 1978). The outcrop is bisected by the waters of the Rio Grande, which originally flowed west of the basalt barrier, with wide open alluvial deposits from the Rio Salado and Rio Puerco on both sides. Advantages inherent to this site's location include the vistas across the Rio Grande Valley and the numerous cloud-bearing fault-block mountains that rise along its margins. Landscape incorporation is common at Cerro Indio and these vistas and landforms often form clear relationships with individual petroglyphs. (This concept will be addressed in more detail in the Discussion section.) To the northwest are the rugged Sierra Ladrones with Ladron Peak rising to over 9,000 feet. To the northeast are the Los Pinos mountains, reaching over 7,500 feet. Polvadera Mountain, Socorro Peak, and the Magdalena Mountains all rise to similar heights on the southwestern horizon. This riparian corridor provides habitat for the massive migration of sandhill cranes, whopping cranes, and other birds, a seasonal phenomenon that also influenced petroglyph production at this site. Another advantage to the site's location is its proximity to fertile agricultural fields. The Rio Salado, which originates in the Datil Mountains and flows along the southern foothills of Ladron Peak, is a tributary that joins the Rio Grande just upstream from Cerro Indio. Due to this confluence and the fertile silt deposited here, the area from La Joya to San Antonio has been a valuable spot for agriculture since prehistoric times (Gossett 1984). Despite a yearly average precipitation of a mere 9.13 inches (Western Regional Climate Center 2000), this valuable resource undoubtedly encouraged the new settlements that developed early in the Pueblo IV Period.

At the center of the Cerro Indio landscape are the plaza and habitation units that surround it. The site includes about 117 rooms that enclosed the plaza and a single kiva. Cerro Indio Pueblo was occupied by Piro people primarily during the Glaze A pottery period in the early 1300s with a minor reoccupation period in the 1500s (Glaze E and F) (Marshall and Walt 1984). The primary occupation period is a time marked in part by significant population growth (approximately a seven-fold increase) and colonization of new riverine areas such as Cerro Indio (Marshall and Walt 1984). The beginning of the Pueblo IV period is characterized by large-scale migrations and the mixing of diverse populations to create large new settlements and regionally diverse artistic expressions. It is also a time associated with an artistic florescence in the Pueblo region. At Cerro Indio, Mogollones likely mixed with neighboring populations from the Colorado Plateau to create a new type of settlement and a rock art system unlike that of any other known Pueblo site. Schaafsma (1994) observes many Jornada design characteristics among the estimated 300 to 400 masks at the site. Such characteristics include flat top outlines, horizontal facial striping, almond eyes, vertical line pupils, chin markings, downturned mouths, terrace patterns, and asymmetrical design (Schaafsma 1994). However, many mask designs at Cerro Indio are also found at other Pueblo IV sites throughout the Rio Grande Valley to the north, suggesting the widespread importance of particular kachinas among Pueblo communities of this time. These designs, such as the
bloody hand kachina, are unique to Pueblo communities and are not known to occur in the Mogollon region to the south. Other images, such as the fine-line polychrome kachina paintings that are found in the small isolated rock shelters along the slopes, are reminiscent of paintings at Abo Pass (part of Salinas Pueblo Missions National Monument). Despite some commonly repeated designs, the Cerro Indio kachinas are carefully rendered, intricately designed, highly individualized, and more numerous than at any other site of its size. Attributes of the Jornada artistic tradition that occur in Cerro Indio rock art are not surprising given its location along the Jornada/Pueblo transition zone and their production during a time of population reorganization.

RESULTS OF THE KACHINA INVENTORY

Results of the kachina inventory at Cerro Indio confirm that kachinas are an important part of the rock art landscape. The methodology and classification system used in the inventory is described in detail by Saville (2001). A total of 79 individual kachinas (mask designs only) were identified in the sample area, making up 16.12% of the total inventory. The sample area includes a large portion of the eastern slope concentration. Kachinas occur on both basalt (90%) and caliche (10%) surfaces and are both pecked (79.75%) and painted (20.25%). Of those pecked, 65% were densely pecked, a technique that is far more common at Cerro Indio than at other sites in the Eastern Pueblo Province (Saville 2001). Facial features common at Cerro Indio include dot and absent eyes (50.5% and 19% respectively), absent nose (98.5%), absent and dot mouth (44.25% and 27.75% respectively), flat topped and circular outline (62% and 33% respectively), absent and feathered headdresses (54.25 and 22.75% respectively), and absent teeth and ears (91.5% and 97.5% respectively). Facial decoration for kachinas at Cerro Indio is highly individualized (Figure 2) and consequently the “other” category received 59.5% of the total, while 33% had no decoration at all. Many of the facial designs are elaborate and detailed, with nearly equal occurrences of both symmetrical and asymmetrical designs (47% and 48% respectively). Rock incorporation was not common with kachinas at Cerro Indio (96% absent). Kachinas were found isolated (15.25%), as part of a panel (30.25%), and in conjunction with other kachinas (54.5%). Kachinas here face all directions except down, with many facing south (22.75%) and southeast (25.25%). However, at Cerro Indio there are also a sizable number of kachinas that face east (20.25%).

DISCUSSION: RELATIONSHIPS IN THE LANDSCAPE

The kachinas of Cerro Indio can be examined quantitatively, as in the preceding section, and can also be described in terms of their relationships with other landscape elements. It is the interactive quality of petroglyphs and pictographs
and the nature of their surroundings that provides a meaningful context for the images and alters the way we view them and the entirety of the landscape. Meinig has commented on the various ways that any landscape can be viewed. He notes that landscape perceptions "are concerned ... with the essence, with the organizing ideas we use to make sense out of what we see" (Meinig 1979:34). With this in mind, a landscape interpretation of Cerro Indio will describe the kachinas that are present as well as provide some insight regarding the context in which kachinas and other rock art images occur at this location.

The Cerro Indio rock art landscape may be viewed as a reflection. Here, the center reflects the periphery. At the center of the landscape is the pueblo of Cerro Indio, which sits atop an elongated basaltic butte with clear distant vistas in all directions. Rock art concentrations along the crest of its slopes are aligned with the four directions. Two small concentrations are found on the north and south points and two large concentrations are located along the center portions of the long east and west slopes. All concentrations show a major focus on kachinas as evidenced by the 175 kachinas (not including ceremonial dancers) that were found on the slopes beneath the pueblo. Cerro Indio kachinas are likely the most diversified and individualized of any site in the Eastern Pueblo region. Although it is difficult to characterize kachinas at this site, most are densely pecked and commonly have flat-topped or circular outlines, elaborate facial decoration, and some kind of facial features. Painted kachinas at the site are often more abstract in design and may not have obvious facial features. Perhaps this concentration of various personages, so carefully depicted, was meant to summon the presence of kachinas from places within the surrounding landscape.

The rock art of Cerro Indio mirrors what surrounds it not simply by choice of subject matter, but also through landscape incorporation. Relationships with landscape features including animals and landforms are apparent in the placement and content of the imagery. The seasonal migration of cranes and other birds, whose route passes over the butte, is represented in the rock art. An abundance of mule deer tracks pecked into the boulders lead the animals to natural water...
retaining depressions in the rocks. Near and distant landforms are also reflected in the rock art. The placement of a terrace design on the edge of a rock on the west slope appears to reflect the contours of the distant Sierra Ladrones, which serve as the backdrop for the petroglyph. The masked serpent pictured in Figure 3 is given three-dimensional form by the rock formation on which it was created. The natural rock alignment behind it creates the illusion of a snake slithering up the side of the butte. In the sample area a natural canvas is made of caliche deposits and rock shelters are used as discrete locations for fine-line paintings of kachinas and supernatural beings. At Cerro Indio, the physical landscape is drawn into the rock art to enhance its expression and the images become animated as if they were three-dimensional living parts of the landscape.

CONCLUSION

The rock art of Cerro Indio is dominated by images of kachinas and other elements derived from the surrounding environment. These images reflect not only a close relationship with the landscape, but also reveal the interconnectedness of the Pueblo and Jornada Mogollon artistic traditions at this frontier location. Kachinas are a major element of the rock art record throughout the Pueblo region and occur in particularly dense concentrations at Cerro Indio. Here many kachinas display signs of the Jornada masking tradition including flat-topped masks, horizontal facial banding, almond-shaped eyes or eyes with pupils, rainbow chin markings, and down-turned mouths (Saville 2001). The Cerro Indio kachinas and other rock art elements engage the landscape of which they are a part through their interactive qualities. The sight and song of the migrating sandhill cranes, the rugged contours of mountains on the horizon, the three-dimensional form of natural boulder alignments and rock shelters, smooth white caliche surfaces, and many other features of the landscape are evoked by rock art images to give them a level of vitality beyond that of an ordinary two-dimensional image.

The settlement and rock art of Cerro Indio were likely the result of an intermingling of diverse peoples, who came to have an intimate relationship with the landscape in which they lived. The rock art shows clear connections to both Pueblo and Jornada traditions and thus raises many questions about how the pueblo of Cerro Indio came to be and whether the rock art was a product of primarily Pueblo or Jornada traditions. Perhaps the Piro people developed a unique type of ceremonial center that served the needs of a cross-cultural population living along the Pueblo frontier. Jornada influence in the rock art could have been limited to stylistic expressions or particular personages rather than a wholesale adoption (and adaptation) of social and religious beliefs and practices as suggested by Schaafsma. Also the possibilities of Anasazi artists inspired by (or copying) Jornada works, Jornada artists residing at Cerro Indio, or Cerro Indio as a settlement founded by Jornada people who became Anasazi cannot be excluded. Regardless of the origins of the kachina iconography at Cerro Indio, the rock art suggests that these people conceived themselves as part of the landscape. The images they created to encircle their community reflect this intimate relationship by harnessing various sensations from the landscape and using it to bring life to images pecked and painted on stone.
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Wellmann, Klaus F.

Western Regional Climate Center
The focus of this paper is the area bounded by Montezuma Canyon in the east, Cedar Mesa in the west, Milk Ranch Point on the north, and the San Juan River plus Chinle Wash on the south (Figure 1). In this area, the archaeological record shows that the Basketmaker III (A.D. 500-750) occupation appears to be unusually homogeneous across most of the area; the later prehistoric occupations do not have this same consistency. Although there is no distinct boundary, the prehistoric occupation east of Recapture Wash by the Mesa Verde culture generally appears to be related to that of southwestern Colorado through time while the prehistoric occupation west of Recapture Wash and along the San Juan River by the Mesa Verde culture appears to be influenced by northeastern Arizona and northwestern New Mexico during much of the A.D. 750 to 1300 time period (Pueblo I through Pueblo III). Some of the cultural differences between the eastern and western parts of the study area that develop over time will be discussed in this paper.

Figure 1
The study area, showing the dividing line between the eastern and western parts, the location of Comb Ridge, and the elevations at several locations.
METHODS

The data analyzed in this study come from personal projects and my exploration of southeastern Utah over the last three decades. Although my primary archaeological interest, like that of Helen and Jay Crotty, has always been rock art, I became involved with southeastern Utah’s prehistoric roads in 1988 when they were rediscovered (Severance 1999). The need to know the dates of sites along these roads in southeastern Utah led to a study of southeastern Utah’s pottery. I conducted a controlled surface collection for the Bureau of Land Management at 42Sa5222 in the South Cottonwood drainage as mitigation for ongoing impacts to this site by local residents and tourists. As of the time of writing, I’ve finished the microscopic analysis of 12,000 sherds, recording 16 variables for each sherd. The analysis shows that the occupation of this site starts in Basketmaker III and continues, probably intermittently, into late Pueblo III. As a result of this long occupation, the middens contain almost every type of pottery created by the Mesa Verde culture.

Many of the sherds at 42Sa5222 were made from a dark firing clay. During my analysis of the pottery, I included an in-depth study of these sherds.

The term “black paste” was applied to them (Figure 2) by Utah researchers because the “normal” clays used by potters in southeastern Utah fire to a lighter color (Figure 3). This dark paste clay apparently has a higher iron content than the clay used in most of the pottery found in southeastern Utah which causes the pottery to turn dark gray or black when fired in a neutral or reducing atmosphere (Shepard 1956:23-24). Based on initial observations using a Munsell Color (1988) gray scale, N6 was determined to be the neutral color. Sherds with this shade of gray can be either black paste or normal. If the color is N3, N4, or N5, the sherd is black paste; if the color is N7, N8, or N9, the sherd is not black paste. The clays used in black paste pottery appear to be from the upper part of Chinle formation, which, in the study area, occurs along the base of 260 m high Comb Ridge (Figures 1, 4). The lighter firing clays most likely come from the Morrison Formation shales which can be found in most of southeastern Utah east of Comb Ridge.

This dark firing clay was used in some of the gray wares in southeastern Utah starting in Basketmaker III and continuing through the abandonment of the area during the late Pueblo III time period. From the Pueblo II time period until the study area was abandoned, it was also
used in some of the white wares. I will not be discussing the use of this dark firing clay in the red wares across the study area because of a lack of adequate distribution data; however, it appears to have been used in some of the Abajo Red-on-orange, Bluff Black-on-red, and Deadman’s Black-on-red pottery at 42Sa5222.

For additional data on black paste ceramics at sites in the study area, I examined part of the sherd collection excavated at Monument Village (42Sa971) in Montezuma Canyon by Brigham Young University. I also recorded black paste information on sherds at 31 sites in the field. At each of these sites I tried to find at least 16 diagnostic sherds of each type. Because most of the sites are relatively small, this usually was a challenge. If I was able to record data at more than one site from the same time period in an area, I averaged the results. Unfortunately, I am unable to include information on the pottery in Comb Wash, at the base of Comb Ridge, due to the lack of an adequate number of diagnostic sherds on the surface of most of the sites.

These studies were supplemented with information from reports on archaeological investigations in the study area in order to provide a more complete picture of the prehistoric occupation.

The following is a description of the cultural similarities and differences observed in the study area during the Basketmaker III through Pueblo III time sequence. Figure 1 shows the locations of areas used in my black paste study as well as the elevations of those areas.
DISCUSSION

I used one or more pottery types to represent a given time period in my black paste study. The type descriptions and the dates that they are used are from Breternitz et al. (1974) except where noted. The Pecos classification system is used to describe the time periods.

Basketmaker III (A.D. 500 - 750)

Basketmaker III sites are found throughout the study area, usually in single family or extended family units, at all elevations up to approximately 2200 m. Chapin Gray pottery is used to represent this time period in my black paste study. The black paste distribution for this time period shows a very unusual pattern (Table 1). Even though the only clay source in the study area for this pottery appears to be in the Chinle formation at the base of Comb Ridge, the distribution is relatively consistent from Alkali Ridge to Cedar Mesa. The 41% on Alkali Ridge is exceeded only by the 52% in Chinle Wash, while 42Sa5222 at 28%, Cedar Mesa at 31% and Milk Ranch Point at 38% have similar percentages. The percentage drops significantly only in Montezuma Canyon at 8%. Because Montezuma Canyon is 370 m below Alkali Ridge and somewhat isolated from it, this drop in percentage is not surprising. The relatively even distribution in the rest of the study area is in marked contrast to later time periods and would

Figure 5

Chacoan style masonry structure at the mouth of Arch Canyon. The construction is rubble core with veneer exterior.
Table 1
Percentages of black paste pottery at locations in the study area from Basketmaker III through Pueblo III. Numbers in parenthesis are number of diagnostic sherds in the samples. N/D stands for “no data.”

<table>
<thead>
<tr>
<th>Time Periods &amp; Ceramic Types</th>
<th>Milk Ranch Point</th>
<th>Cedar Mesa Wash</th>
<th>Chinle Wash</th>
<th>42Sa5222</th>
<th>Alkali Ridge</th>
<th>Montezuma Canyon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basketmaker III (A.D. 500-750) Chapin Gray</td>
<td>38% (16)</td>
<td>31% (32)</td>
<td>52% (46)</td>
<td>28% (233)</td>
<td>41% (79)</td>
<td>8% (36)</td>
</tr>
<tr>
<td>Pueblo I (A.D. 750-900) Moccasin Gray &amp; Mancos Gray</td>
<td>71% (17)</td>
<td>N/D</td>
<td>63% (68)</td>
<td>22% (142)</td>
<td>N/D</td>
<td>17% (30)</td>
</tr>
<tr>
<td>Early-Mid Pueblo II (A.D. 900-1060) Mancos Corrugated</td>
<td>16% (25)</td>
<td>N/D</td>
<td>N/D</td>
<td>9% (22)</td>
<td>8% (49)</td>
<td>4% (26)</td>
</tr>
<tr>
<td>Pueblo II/Pueblo III (A.D. 980-1300) Mancos B/W</td>
<td>64% (47)</td>
<td>N/D</td>
<td>65% (17)</td>
<td>30% (589)</td>
<td>2% (61)</td>
<td>0% (13)</td>
</tr>
<tr>
<td>Late Pueblo II/P III (A.D. 1060-1300) Dolores Corr. &amp; Mesa Verde Corr.</td>
<td>13% (32)</td>
<td>6% (48)</td>
<td>24% (17)</td>
<td>7% (30)</td>
<td>0% (32)</td>
<td>0% (15)</td>
</tr>
<tr>
<td>Late Pueblo II/P III (A.D. 1060-1300) McElmo B/W &amp; Mesa Verde B/W</td>
<td>75% (32)</td>
<td>36% (78)</td>
<td>29% (17)</td>
<td>36% (198)</td>
<td>6% (33)</td>
<td>2% (60)</td>
</tr>
</tbody>
</table>

appear to be more than just a statistical quirk. Apparently these people were extremely mobile and/or groups across the study area were able to trade freely with each other. The results might also indicate that black paste pottery was preferred for certain cooking tasks and therefore was a necessary part of every Basketmaker III “cook kit.”

In Recapture Wash north of Blanding, one “great pithouse” from this time period measuring 13 m in diameter was partially excavated before the construction of a reservoir (Nielson et al. 1985). In addition, I have found one possible great pithouse or great kiva 18 m in diameter in Comb Wash. No similar features have been found for this time period east of Recapture Wash.

**Pueblo I (A.D. 750 - 900)**

Moccasin Gray and Mancos Gray are used to represent the Pueblo I time period in my black paste study. Mancos Gray is also found in early Pueblo II collections, so for 42Sa5222 I used only Moccasin Gray. In Montezuma Canyon, I used Mancos Gray which might slightly skew the results for that area because there were so few (4) Moccasin Gray sherds in the part of the collection from 42Sa971 that I worked with. Moccasin Gray was not common on Alkali Ridge during the Pueblo I time period. Brew (1946:291) states: “Our findings show that the local potters very seldom left the bands showing on the necks of Pueblo I jars.”

During the Pueblo I time period there is a radical change in the distribution of black paste pottery compared to the Basketmaker III time period (Table 1). It would appear that the people living west of Come Ridge have become somewhat isolated from those living in the rest of the study area. Milk Ranch Point sees an increase in the percentage of black paste pottery to 71% and Chinle Wash to 63%; in the central part of the area, 42Sa5222 decreases to 22%. In the east, apparently there is more demand for black paste pottery than during the Basketmaker III time period because the percentage in Montezuma Canyon doubles to 17%.

This extreme change in the distribution of black paste pottery gives the appearance of being caused by a disruption in trade or a change in lifestyle.
from that of the Basketmaker III time period. Or possibly the ceramic technology has advanced to the point that other pottery can do the tasks that previously required black paste pottery. This would mean that most households east of Comb Ridge no longer feel the need to acquire it in the same quantities as in the earlier time period.

At this time a significant difference between east and west appears in the white wares. The dominant Pueblo I white ware in the east are Chapin Black-on-white and Piedra Black-on-white -- the same as in southwestern Colorado. In the west, the dominant white wares are Chapin Black-on-white and White Mesa Black-on-white. White Mesa Black-on-white is essentially the same as Kana-a Black-on-white (Colton 1955) in northern Arizona during this same time period except it is made with crushed igneous rock temper instead of quartz sand temper.

During the Pueblo I time period, sites in the study area are generally found at elevations above 1750 m and at favorable locations along drainages at lower elevations. The climate at this time is warmer and drier, so higher elevations are used for farming to take advantage of the greater amount of available moisture (Petersen 1988:115). As would be expected, a large increase in the number of sites occurs on Milk Ranch Point where "the most common site on the mesa is a small (1-5 room), Pueblo I period, habitation site" (DeBloois 1975:75). Site density at this time on Milk Ranch Point is 19 sites per square mile (DeBloois 1975:89). At lower elevations, the availability of water seems to be the most important factor in site location. Along the San Juan River, the area around the mouth of the South Cottonwood drainage was an especially popular area for Pueblo I settlements.

The Pueblo I time period is generally a time when people consolidate into villages throughout much of the region. It also sees the movement of large numbers of people into and out of different parts of the northern San Juan area several times during this 150 year time period (Wilshusen and Ortman 1999). In the eastern part of the study area, Brew (1946) excavated 14 pit houses and 143 surface rooms at an early Pueblo I village, the well known Site 13 on Alkali Ridge (42Sa13). This is the largest Pueblo I site that has been documented in the study area, and it appears to be unique. Brew (1946:296) found that "(a)fter the Abajo Phase of Site 13 there is a hiatus in our excavated material. ... no level corresponding to late Pueblo I in the Pecos Classification was found on Alkali Ridge."

Where did the people living at Site 13 go to later in the Pueblo I time period? One possibility is Montezuma Canyon to the east where Bluff Black-on-red and Deadman's Black-on-red pottery, later Pueblo I red wares, are found in significant amounts (Miller 1972; Patterson 1975; Harmon 1979).

In most of the western part of the study area, a population peak occurs at this time. The exception is Cedar Mesa where just a few sites from the Pueblo I time period are found. They are mostly located in the northern part (Dalley 1973; Wilson 1974) and on the eastern rim overlooking Comb Wash (Haase 1983:1). Apparently the rest of Cedar Mesa is not occupied at this time (Matson et al. 1988).

At 42Sa5222 I found a prehistoric road that appears to have been constructed in the Pueblo I time period--the earliest that I've found in southeast Utah. It is narrower than later prehistoric roads and goes to the remains of a structure that has Pueblo I ceramics associated with it. John Stein (personal communication 2002) confirmed that these attributes are similar to those of early prehistoric roads that have been found in northwestern New Mexico.

I have looked at seven great kiva depressions with ceramics dating to this time period in the western part of the study area compared to none in the east. None of the Pueblo I great kiva depressions that I have examined have direct connections to
prehistoric roads; however, prehistoric roads are close to all of them, indicating that they were placed near routes that were either formal or informal.

**Early to Middle Pueblo II**  
(A.D. 900 - 1060)

Mancos Corrugated gray ware is used to represent the early to middle Pueblo II time period in my black paste study.

Cortez Black-on-white was the white ware in the Mesa Verde region from the beginning of this time period until about A.D. 1000. Mancos Black-on-white appeared after A.D. 980 and was used until the area was abandoned at about A.D. 1300.

Mancos Black-on-white was the first white ware to be made with iron rich clays. Because it was made during both the Pueblo II and Pueblo III time periods in the study area, it will be discussed in the late Pueblo II/Pueblo III section.

The percentages of black paste sherds in Mancos Corrugated gray ware changes significantly from the percentages in the Pueblo I gray wares (Table 1). On Milk Ranch Point, the percentage drops from 71% in Pueblo I to 16%. This coincides with the start of production of white ware made with black paste clay and indicates a major change in direction by potters. It appears that this iron rich clay has characteristics that are now desirable in pottery that is not used for cooking. Over the rest of the study area, the amount of black paste pottery is relatively even at low percentages with 42Sa5222 at 9%, Alkali Ridge at 8%, and Montezuma Canyon at 4%.

Unit pueblos become the dwelling of choice as people abandon their Pueblo I pithouse communities.

In the eastern part of the study area, an early Pueblo II occupation can be found in Montezuma Canyon (Thompson et al. 1988; Wintch 1990) and on Alkali Ridge (Brew 1946; Honeycutt and Fetterman 1985). Honeycutt and Fetterman (1985:93) conclude that “both survey and excavation data suggest that the Pueblo II time period was the height of Anasazi population on Alkali Ridge.” In contrast, in the western part of the study area, most of Cedar Mesa has been abandoned (Matson et al. 1988); however, a few sites from this time period have been recorded in the northern part (Dalley 1973; Wilson 1974). In the middle of the study area, on White Mesa south of Blanding, excavations by Abajo Archaeology found just 31 Cortez Black-on-white sherds (.33% of the total) at 42Sa6396 (Davis 1981:222). This site had Basketmaker III, Pueblo I, and Pueblo II occupations. At Aromatic Village (42Sa9937), also on White Mesa south of Blanding, a hiatus was noted early in the Pueblo II time period. This site was occupied during both the Pueblo I and Pueblo II time periods (Talbot et al. 1982). At 42Sa5222 in the South Cottonwood Wash, I identified just 3 sherds of Cortez Black-on-white pottery compared to 589 Mancos Black-on-white sherds. An occasional Cortez Black-on-white sherd can be found at sites along the prehistoric road system in the western part of the study area, but they are not common; most of the area west of Recapture Wash has a low population density at this time.

Pueblo II appears to be the time when construction started on most, but not all, of the prehistoric roads in the study area. The following statement about prehistoric roads refers to northwestern New Mexico, but most of it is appropriate for southeastern Utah:

The ephemeral nature of the features commonly referred to as “roads” makes them very difficult to identify, document and date. The most secure interpretations have been made from linear features articulated with dateable components of ritual landscapes. In this setting, it is common for linear constructions to form tangible connections between discrete temporal features dating from the opening of the sixth to the close of the thirteenth centuries.
Formalized, but isolated segments of linear constructions, where datable ceramics are in clear association, will invariably date to the period of the "Chaco Classic". However, numerous examples of constructed linear features, with little in the way of ceramic association, are known from the late 12th and 13th centuries. The presence of ceramics may convincingly establish the time for an episode of construction and use of an alignment, but the absence of ceramics does not preclude earlier and or later episodes of construction and use where durable, datable materials were not a part of the construction-use process (Ruppe et al. 2001).

I have had most of the same problems in trying to determine when the prehistoric roads in southeastern Utah were constructed. Unfortunately, sherds or other cultural artifacts are rarely found on these roads making the determination of the dates of construction even more problematic. It obviously took a very long time to formalize the more than 100 miles of trails that have been found to date in southeastern Utah; however, it would appear from the associated sites that most of the construction that we can see today was done during the Pueblo II and Pueblo III time periods.

The presence of a probable Pueblo I prehistoric road at 42Sa5222 would indicate that some of the later prehistoric roads could be modified Pueblo I roads; this early prehistoric road would not have been an isolated occurrence.

Prehistoric road segments have been found along the San Juan River and in all of its northern tributaries in the study area as well as on Alkali Ridge, Mustang Mesa (west of Alkali Ridge), White Mesa (Blanding area), Black Mesa (west of the South Cottonwood drainage), Tank Mesa (south of Black Mesa), and Cedar Mesa.

Unit pueblos with multiple occupations from Basketmaker III or Pueblo I through Pueblo III are found adjacent to a few of the prehistoric roads. Apparently these sites had different functions than the typical unit pueblo. In the South Cottonwood drainage, I believe that they were used seasonally, along with the great kivas, for people going to and from the farming areas at higher elevations (Severance 1999).

I have looked at five great kiva depressions in the western part of the study area that appear to date to this time period compared to none in the east. Four of them have associated prehistoric roads.

Late Pueblo II and Pueblo III (A.D. 1060-1300)

Dolores Corrugated and Mesa Verde Corrugated gray wares along with McElmo Black-on-white and Mesa Verde Black-on-white are used to represent this time period in my black paste study. Mancos Black-on-white pottery, which was made over a longer time period is discussed first.

In southwestern Colorado, the use of Mancos Black-on-white ends at about the time Mesa Verde Black-on-white appears at around A.D. 1200. In southeastern Utah, Mancos Black-on-white appears to have been produced from about A.D. 980 until the area was abandoned at about A.D. 1300. On Alkali Ridge, Brew (1946:291) found “a few Mancos Black-on-white sherds ... in all the sites bearing Mesa Verde-type [McElmo Black-on-white and Mesa Verde Black-on-white] pottery.” This seems to be the situation throughout the study area. Most late sites in the study area have Mancos Black-on-white, McElmo Black-on-white, and Mesa Verde Black-on-white pottery which would indicate that the late population peak in the western part of the study area started at approximately A.D. 1200.

Mancos Black-on-white is the first of the white wares to be intentionally made with black paste clays; white slip was used to disguise the dark surface of the pottery. For reasons that are unknown, starting in the 10th century, potters decide to de-emphasize the production of black paste gray ware and start making substantial quantities of black...
paste white ware instead. Table 1 shows the percentage of black paste Mancos Black-on-white in the western part of the study area is much higher than that for the early to middle Pueblo II type Mancos Corrugated gray ware which may indicate that the shift to black paste white ware began rather suddenly in the early to middle Pueblo II time period. Milk Ranch Point and Chinle Wash have similar percentages at 64% and 65% while 42Sa5222 has 30%. In the east, the percentages for Mancos Black-on-white are low at 2% on Alkali Ridge and 0% in Montezuma Canyon.

The black paste distribution in the late gray wares, Dolores Corrugated and Mesa Verde Corrugated is shown in Table 1. By the late Pueblo II/Pueblo III time period, the percentage of black paste pottery in the east drops to 0%. Chinle Wash, at the base of Comb Ridge, has the highest percentage at 24%; Milk Ranch Point at 13% is the only other location with more than 10%. These are the lowest percentages of black paste gray ware for any time period.

The last line in Table 1 shows the percentages for McElmo Black-on-white and Mesa Verde Black-on-white. Milk Ranch Point has the highest percentage of black paste pottery for any of the time periods at 75%. This may indicate an inability to easily obtain clays from the Morrison formation or pottery made from that clay. The percentages for Cedar Mesa, Chinle Wash and 42Sa5222 are about the same at 36%, 29%, and 36% respectively. In the east, Alkali Ridge has 6% and Montezuma Canyon 2%. These last two are low percentages, but they show that black paste white ware is still available in all parts of the study area.

During this time period, unit pueblos remain popular.

In the east, a transition similar to the one taking place in southwestern Colorado is going on in the A.D. 1200s: many people are aggregating into communities (Honeycutt and Fetterman 1985:27). In the last half of the A.D. 1200s, people start to leave the area and most of those remaining move to canyon head sites around springs. In southwestern Colorado, pueblos such as Sand Canyon, Goodman Point and Yellowjacket are built around springs in canyon heads after A.D. 1260 (Scott Orman, personal communication 2002). I have found similar, but smaller, canyon head sites east of Recapture Wash; none west of it.

In the western part of the study area, a different scenario takes place. Near the beginning of this time period, people from the Kayenta area move onto Cedar Mesa, most of which had been abandoned by the Mesa Verde people at the end of the Pueblo I time period. They bring their own pottery which consists of Sosi Black-on-white and Dogoszhi Black-on-white (Colton 1955), along with sand tempered gray wares. They live primarily in jural surface structures with an associated pit structure. They also appear to have constructed prehistoric roads. Next to a north-south prehistoric road on Cedar Mesa, I found two Kayenta sites: a great kiva depression and a unit pueblo. Both had Kayenta pottery from this time period. It appears that this road was used as an immigration route to allow newcomers to move to the north end of Cedar Mesa and farther west onto Mossback Butte, west of the study area.

During this time period, several sites in the western part of the study area show Chacoan influence. At the mouth of Arch Canyon, which heads at the south end of Milk Ranch Point and drains into the west side of Comb Wash, people familiar with the construction of Chacoan buildings build what appears to be a Chacoan outlier. One of the buildings still standing has classic Chacoan construction consisting of rubble core and veneer walls along with a second story setback. This building would be at home in Chaco Canyon (Figure 5). The site also has what appears to be a "D" shaped great kiva. In addition, two prehistoric roads in Comb Wash appear to go to the site - one from the north and one from the south. Recent reports on excavations at the Edge of the Cedars State Park in Blanding (Hurst 2000) and at the
“Bluff Great House” at Bluff (Jalbert and Cameron 2000) discuss construction features at these sites that appear to have been influenced by the Chaco culture.

Around A.D. 1150, or a short time later, Mesa Verde people come flooding back into the area west of Recapture Wash. How much of this influx is directly related to the collapse of the “Chaco Phenomenon” cannot be determined at this time.

The first farmers to walk away from the Chacoan world benefited the most. They returned to places of ancestral Basketmaker and early Pueblo I hamlets in the uplands even before violence overtook the Chacoan core in the 1100s. A return to the uplands was utterly logical. Many upland districts such as Mesa Verde had lost most of their population during the two centuries of Chacoan expansion (Stuart 2000:125).

The second population peak in the western part of the study area occurs around A.D. 1200. Mesa Verde people fill up the best farming areas and force the newcomers to move into unpopulated territory north and west of the study area. They also move back onto Cedar Mesa where they trade pottery to the Kayenta people living there and probably intermarry with them. In the cliff dwellings in Cedar Mesa's canyons, I have seen construction attributes of the Kayenta culture in sites that otherwise appear to be Mesa Verde sites. Examples are a rectangular kiva (Lindsay et al. 1968:246) at Turkey Pen ruin and Kayenta entry-box complexes (Lindsay et al. 1968:261) in rooms at several other sites. I have also seen several sites with unusual structures consisting of jacal rooms built on top of masonry rooms. The Kayenta people typically built jacal structures in southeastern Utah while the Mesa Verde people usually built masonry structures.

I found a very interesting late site near the head of Grand Gulch several years ago that combines Kayenta, Mesa Verde and Chacoan traits. It consists of a great kiva depression 18 m in diameter, an adjacent multiple story room block, and a prehistoric road terminating at the great kiva. They give this site the appearance of a Chacoan outlier. In addition, there are two unit pueblos at the site. One of the unit pueblos has a masonry room block, kiva depression, and midden with Mesa Verde ceramics; and, next to it, the other one has a probable jacal room block, a kiva depression, and a midden with Kayenta ceramics. The midden for the great kiva contains Sosi Black-on-white, Dogoszhi Black-on-white, Flagstaff Black-on-white and Tusayan Polychrome from the Kayenta culture as well as Mancos Black-on-white, McElmo Black-on-white and Mesa Verde Black-on-white from the Mesa Verde culture. Based on the presence of these late pottery types, this complex is post Chaco and was most likely constructed in the A.D. 1200s.

Unlike the people living east of Recapture Wash, the Pueblo III people in the west did not aggregate into large pueblos or move to canyon head sites around springs. They did, however, build towers near springs, presumably to guard the water sources or show ownership of the water.

The Cedar Mesa area is probably abandoned around A.D. 1270 (Matson et al. 1988). Most of the rest of the study area is abandoned by A.D. 1300, and none of it is re-occupied by a Pueblo culture (Stuart 2000:142).

I have looked at 14 great kiva depressions in the west that appear to date to this time period compared to none in the east. All of them have associated with prehistoric roads.

CONCLUSIONS

The results of my black paste study show that the distribution of black paste pottery during the Basketmaker III time period is surprisingly homogeneous across most of the study area in spite of the geographically limited availability of the iron rich clays used to make it. Only in Montezuma
Canyon area is there a reduced percentage of black paste pottery at Basketmaker III sites. It would appear that the mobility and interaction among the people in the study area are greater than they would be at any time in the future. The question is what caused this significant change during later time periods? Was it solely because of the greater emphasis on farming which required more attention to crops and therefore less emphasis on moving around the study area while hunting and gathering? Or did something else happen that restricted the distribution of black paste pottery after the Basketmaker III time period?

Some general conclusions can be stated about the distribution of black paste pottery during subsequent time periods. First, the only areas where the percentage of black paste pottery exceeds 50% in any time period are Milk Ranch Point and Chinle Wash - the two locations closest to the Chinle formation. Second, during all time periods, the percentage of black paste pottery always decreases going east from Comb Ridge. Third, Cedar Mesa and 42Sa5222 in the South Cottonwood drainage, which have similar access to the Chinle formation, have similar percentages of black paste pottery. Fourth, during the Pueblo II time period, the emphasis in black paste pottery changes from gray ware to white ware. And fifth, no matter where people live in the study area, they always can obtain black paste pottery if they want it. Conversely, pottery made from light firing clays is also always available across the study area. This implies that the way a specific piece of pottery is to be used determines the type of clay that it is made from. However, it is not clear whether clay, pottery or both are traded in the study area.

Cultural differences between the eastern and western parts of the study area from the Pueblo I time period through the Pueblo III time period can be summarized:

1) The dominance in the west of White Mesa Black-on-white, which is a variation of Kana Black-on-white from the Kayenta area, contrasts with the dominance of Piedra Black-on-white in the east at this time. This indicates influence from the south and the possible the immigration of people from the Kayenta area into the western part of the study area.

2) Much of the western part of the study area is almost completely abandoned from the end of the Pueblo I time period until the late Pueblo II time period - about 150 years. The exceptions appear to be primarily in areas along the prehistoric road system and at higher elevations such as Milk Ranch Point where intensive farming is apparently taking place. The eastern part of the study area does not have a similar period of abandonment and reaches a population peak during the Pueblo II time period.

3) People from the Kayenta area moved onto Cedar Mesa in the late A.D. 1000s and remained until the area was abandoned about A.D. 1270. They lived alongside the Mesa Verde people who started returning to Cedar Mesa a short time later, trading with them and probably intermarrying with them.

4) The focus of much of the prehistoric road system in the western part of the study area appears to be from the farming areas at higher elevations down to the San Juan River and the prehistoric road that goes up the San Juan River toward New Mexico. Stuart (2000:81-82) describes an experiment that “discovered that walking along the remnants of Chacoan roads between any two points reduced caloric expenditures by an average of 38 % compared with walking on the natural desert floor a few feet outside the roadbed.” The results of this experiment provide a rationale for the prehistoric people to build “farm to market” roads. I have been unable to find any trace of a prehistoric road in Chinle Wash, so there is no indication that the intent is to go south of the San Juan River instead of east.
In Montezuma Canyon, in the eastern part of the study area, a prehistoric road goes up the canyon and has short branches into side canyons. I have not seen any indication that this road system is intended to do anything more than tie together villages in the canyon because the prehistoric road appears to go past the villages rather than to any location within them.

5) An interaction between the Chaco culture and the people living in the western part of the study area is indicated at such sites as the Edge of the Cedars Pueblo near Blanding, the Bluff “Great House”, and the Arch Canyon Ruin at the mouth of Arch Canyon in Comb Wash. No similar interaction is apparent in the eastern part of the study area, even though sites in southwestern Colorado also appear to have been influenced by the Chaco culture (Kendrick and Judge 2000).

6) The western part of the study area has at least 26 great kiva depressions dating to the Pueblo I through Pueblo III time periods. All except two are 14 m or more in diameter. No great kiva depressions have been found in the eastern part of the study area in spite of its being the area with the most archaeological surveys, the result of oil field development in that area. Why is the distribution so lopsided? To me it means that the two areas have evolved in different cultural directions. In looking at the distribution of these great kiva depressions in the western part of the study area, twelve are in the South Cottonwood drainage and seven in Comb Wash. One of the characteristics that these two drainages have in common is that they provide access to the higher elevation farming areas on Milk Ranch Point and adjacent areas. In my opinion, most of these great kivas are part of the prehistoric road/farming system and are not necessarily the focal point for nearby residential sites. The lack of large middens at most of these great kivas indicates to me that they were used primarily by people going to and from the farming areas at higher elevations.

7) The western part of the study area has two population peaks. The first one, during the Pueblo I time period, occurs just before the primary building phase at Chaco Canyon. After this peak, most of the western part of the study area is depopulated. The second peak occurs after the collapse of the Chaco culture. Does the timing of these population peaks in the western part of the study area have any relationship to what was going on in Chaco Canyon? The existence of Chacoan influence in the western part of the study area during the Pueblo II and early Pueblo III time periods would indicate that the timing of these peaks is probably not a coincidence. The population peak in the eastern part of the study area occurs during the Pueblo II time period and does not appear to be related to anything that is happening at Chaco Canyon.

8) The Pueblo III occupation ends differently in the east compared to the west. In the east during the A.D. 1200s, people created relatively large communities. Then, after A.D. 1260, they built canyon head communities around springs as their last gasp before completely abandoning the area. In the west, there is no significant aggregation or retreat to canyon head sites in the A.D. 1200s; however, at a few sites towers are constructed near springs, apparently built to defend the water sources.

FINAL COMMENTS

Many questions remain about the reasons for the differences between the eastern and western parts of the study area, but those differences are real. The two areas evolved differently after the Basketmaker III time period and never again achieved the cultural homogeneity that appears to have existed at that time.
The ties between the western part of the study area and Chaco Canyon exist, but definitive statements about the strength of that connection can't be made at this time. However, I continue to believe that one of the driving factors in the construction of many of the prehistoric roads and most of the great kivas in southeastern Utah was to expedite the export of corn and possibly other food products to northwestern New Mexico.

I do not have any answer as to why great kivas aren't found in the eastern part of the study area; great kivas are found in southwestern Colorado a relatively short distance away. Because the occupation of the eastern part of the study area follows that of southwestern Colorado in so many other ways, it is surprising that the construction of great kivas doesn't occur.

Looking for the answers to questions like these gives me a good excuse to keep exploring southeastern Utah.

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INTRODUCTION

The archaeological evidence for the Navajo occupation of the Southwest is ambiguous. Hypotheses include models that propose entry into the Southwest early (prior to 1400) to those that propose a later date of post 1525. In the late sixteenth century, Spaniards began documenting the presence of nomadic people, perhaps Navajos, in New Mexico. By the early seventeenth century, Navajo occupation of the area was established in the historical record. Dinétah, located in northeast New Mexico, is the place of origin in Navajo oral history (Roessel 1983:3).

When Navajos moved into Chaco Canyon is also unknown as the tree ring dating of Navajo sites was problematic. Most sites that were datable, dated at the earliest to the 1700's (Brugge 1981:98, 1985:13). In 1933 the custodian at Chaco convinced the Crownpoint agency to move Navajos who had large herds out of the Park and began fencing the National Park boundary (Brugge 1980:431). In 1948 the fencing was completed (Brugge 1980:486).

Schaafsma (1980:306) citing Brugge’s reanalysis of Canyon de Chelly tree ring dates placed occupation of Canyon de Chelly in the late 1700’s. After the Pueblo Revolt of 1680 and during the reconquest, Puebloans took refuge with Navajos until reconquest was halted with the destruction of Awatobi in1700. At that time, it is said that Hopis took refuge with Navajos in Canyon de Chelly (Brugge 1983:493; Gilpin 1996:171). Steen (1966:55-56) was told by Navajos that when they arrived in Canyon de Chelly, they found Hopis living there and drove them out. They credited the Hopis with planting the first peach trees in the Canyon. Steen observed that Hopi sherds of the periods from 1300 to 1700 are found at many locations. Navajos continue to live and graze livestock in Canyon de Chelly.

Navajo scholars, including Brugge (1983:491-494), believe that contact with Puebloans profoundly impacted Navajo culture including their ceremonial life and their rock art.

FINDINGS IN CHACO CANYON AND CANYON DEL MUERTO

The preponderance of rock art in Chaco Canyon is comprised of finely scratched or incised intricate scenes often difficult to detect. These complex panels include ceremonial figures and scenes, horses, horses and riders, and panels of people, predominately women wearing decorated clothing and jewelry. Other panels have been deeply incised, abraded inside the incised lines, with paint wiped over them. Schaafsma (1972:53) suggests a Gobernador phase for panels located near Shabikeshchee that are created in this fashion. To support her argument, she cited Vivian’s Master’s thesis of 1960 in which he reported Gobernador polychrome ware found in association with several nearby masonry hogans. Both Navajo ceremonial figures and horses (Figure 1) created by this technique occur in Chaco Canyon.
Panels created by similar techniques also exist in the Dinétah area and are compared to the creation of sandpaintings (Copeland and Rogers 1996:227). Matthews (1902:36) noted that in sandpainting, “The naked bodies of the mythical figure are first drawn and then the clothing put on.” Brugge (1996:266) noted, “The smoothing of the rock surface can be seen as comparable to the smoothing of the sand upon which a dry painting is to be produced.” Elements placed on smoothed surfaces in Chaco Canyon do not reflect a particular motif, but rather include everything from ceremonial figures to inscriptions. Charcoal elements are not common in Chaco rock art.

In Canyon del Muerto panels are most frequently painted or drawn in charcoal. The Spanish cavalcade at Standing Cow and the Ute Raid panels illustrate complex panels executed in these media. Charcoal panels are often difficult to see because of complexity and fading. Fewer pecked, incised, abraded and still fewer lightly scratched or incised panels exist. Panels combining incising, abrading and painting do not to occur in Canyon del Muerto.

In both Chaco Canyon and Canyon del Muerto, there is at least one grouping of white painted anthropomorphic or ceremonial figures that are partially outlined and/or otherwise accented with red and yellow paint. Both are located in shelters away from the main canyon areas. Although less ornate than Dinétah ceremonial figures, the heads of the figures in the Canyon del Muerto panel are outlined in red, one of the features Schaafsma (1971:58) noted about figures found in the Navajo Reservoir District. In Canyon del Muerto there is one outlined white anthropomorphic figure similar in shape to the white painted panel in Chaco.

Rock art motifs in both canyons occasionally incorporate the natural features of the rock such as bumps, spalled areas, holes and cracks.

A pattern of grouping by topic has been detected at Chaco Canyon. For example, panels of women are grouped around the Hungo Pavi/Mockingbird Canyon area. Kolber (1998) reported in depth on the Mockingbird Canyon panels. Horses and horses and riders dominate several rincons in the Chacra Mesa area. Several panels of what may be WWII airplanes and military cargo trucks are located near Padilla Well. If a pattern exists in Canyon del Muerto, it has not been detected by this author.

Figure 1
A panel of horses in Chaco that are incised, abraded and wiped with red paint.
In Chaco Canyon, Navajo rock art was placed primarily on boulders and secondarily on cliff faces while in Canyon del Muerto placement usually occurs in alcoves and on cliff faces. The placement may be related to the nature of the canyons' formations.

Navajo rock art is often found in association with Anasazi rock art as noted by Schaafsma (1971:7). In Chaco this occurs in 20 of the 41 sites documented during the Navajo Rock Art Project. In Canyon del Muerto Navajo rock art and structures, some of which are modified Anasazi structures, are found in alcoves in association with Anasazi rock art and structures.

Horses and Navajo ceremonial figures and objects are the two most commonly found rock art elements in Chaco. Horses are the most frequent subject in Canyon del Muerto. Fewer ceremonial figures are found in Canyon del Muerto than in Chaco. Grant (1978:232) stated that the ceremonial figures in Canyon de Chelly are unlike those found in the Largo/Gobernador region. A few Largo style elements, including ceremonial figures and symbolism, exist in Chaco Canyon. Scenes depicting ceremonies are found in Chaco, but not in Canyon del Muerto.

Both Canyon del Muerto and Chaco Canyon have panels that appear to tell stories. The “War Horse Panel” in the Chacra Mesa area seems to depict a battle as does a scene high on the canyon wall above Petroglyph Trail (Figure 2). At least two helmeted horsemen carrying shields and long lances face three individuals on foot carrying spears and bows and arrows. One of the most complex panels in either canyon is the charcoal Ute Raid panel in Canyon del Muerto. Warriors

Figure 2
A lightly incised Navajo battle scene. Although not shown in the illustration, these elements are in association with Anasazi rock art.

Figure 3
Horses in Canyon del Muerto wearing bridle decorations.
carrying shields and lances or guns ride horseback to face soldiers on foot carrying shields and lances or bows. At one end of the panel, a group of cattle, perhaps being defended by their owners against the raiders, is depicted. Some of the horses wear bridles decorated with tinklers (Figure 3). Bridle decorations are also found in Chaco (Figure 4).

Figure 4
Horses in Chaco Canyon wearing bridle decorations.

Hourglass-shaped figures riding horses are found in both canyons (figures 5, 6). In some cases the riders appear to be ceremonial figures. One panel in particular in Canyon del Muerto of an incised horse with a rider carrying a quirt and a lance appears particularly Chacoan (Figure 5). Brugge (1986:24) reported on a panel of horses and riders (Figure 7) suggestive of Canyon del Muerto’s Spanish campaigners at Standing Cow. However, he indicated that the figures are more crudely done. He did not mention any depictions of priests that cavalcades in Canyon del Muerto include.

Chamberlain and Rogers (2001:52) reported on star ceilings found in Dinétáh, but noted that the majority of star ceilings are located in Canyon de
Chelly. Schaafsma (1980:306) describes these as being from the Gobernador phase. Charcoal “x’s” have been found in Chaco Canyon, but they do not resemble the star ceilings of del Muerto. Chamberlain (1993:103) in citing Williamson indicates that at a site in Chaco Canyon drill hole patterns were found that depict Navajo star constellations.

A buttress in Canyon del Muerto contains images, names and dates from 1940 to 1999. An incised airplane may be of WWII vintage as the dates indicate use during that time.

Deeply incised geometric designs with occasional representational forms, usually either ceremonial or zoomorphic figures, interspersed are found periodically in both canyons.

DISCUSSION

The general assumption has been that Navajos came from the north and moved into the Dinétah. Vivian (1960:230) suggests that they migrated to the south and west as a result of Ute and Comanche attacks; although, he says that a drought in the late 1700’s was also a factor.

Wyman (1983:42) speculates that “because of pressure from intrusive Spanish or Anglo cultures, the Navajos may have adapted the Pueblo custom of making impermanent drypaintings and gave up the practice of rock painting.” Parezo (1983:10) states, “The indirect evidence for the beginning of this shift [from rock art to drypainting], consisting of burned hogans and the building of defensive sites, begins in the 1740’s.”

The relative dating of ceremonial figures in rock art as being early (Dinétah) or later (Chaco) or latest (Canyon de Chelly) is based upon an assumed migration pattern from the Dinétah to Chaco and finally to the west including Canyon de Chelly. However, the Largo Canyon style rock art on top of Chacra Mesa and the Gobernador style panels near Shabikeshchee may indicate an earlier time for occupation and/or the use of that area than the archaeological evidence has been able to prove. The subsequent migration to Canyon de Chelly would be one explanation for the smaller number of ceremonial figures found there. Nevertheless, the likelihood that Hopis
sought refuge with Navajos in 1700 would support a date prior to a shift from permanent to impermanent media for creating ceremonial figures and objects.

Navajos were not a unified tribe, but rather organized into bands, until after the Treaty of 1868. It is possible that different bands moved into several locations of the Southwest at different times. Schaafsma (1980:306) maintains that the reanalysis of tree ring dates supports the idea that Navajos did not arrive in Canyon de Chelly until the late 1700's. Yet in an earlier work, she cited Hester who suggested that there may have been a split among the Navajos prior to the Gobernador Phase (1698-1775), and that the Navajos who went farther west did not have as much contact with Pueblos (Schaafsma 1971:68). She also suggests that if Navajos were creating star ceilings before they came into the Southwest they could appear in both the Dinétah and Canyon de Chelly regardless of the migration pattern. That no Gobernador Polychrome pottery, according to Vivian (1960:224), was found in Canyon de Chelly would support migration from the north instead of the east.

Navajos integrated the horse into their culture as reflected in their oral history, ceremonial life and rock art. The high esteem in which Navajos hold their horses is portrayed by the numerous horses found in the rock art. Horses carrying ceremonial-like figures probably demonstrate their importance in all aspects of Navajo life. Catholic priests with all their paraphernalia on horseback would have been an imposing sight of power and veneration (Larry Loendorf, personal communication 2000). The Canyon de Chelly Navajos depicted priests in the rock art (Figure 8). Substituting ceremonial figures for priests may have been a way to display ceremonial symbolism without incurring the displeasure of missionaries seeking to convert them to Christianity. With the exception of a few clerics, such as Father Berard Haile, who studied the language and culture, the symbolism would have escaped the notice of most missionaries who shunned Navajo religion and discouraged Navajos from participating in their traditional ceremonies. Although the Chaco...
Navajos did not depict priests on horseback, they must have had contact with them and made the connection in their ceremonial symbolism.

The rock art of the two canyons, while similar in some respects, demonstrates variations in technique, placement and subject. There is some evidence that Native Americans still visit rock art sites in Chaco Canyon; however, because Navajos still live in Canyon del Muerto, there is undoubtedly a more active on-going tradition of site usage.

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