SOUTHWESTERN CULTURE HISTORY
Collected Papers in Honor of
Albert H. Schroeder

Contributors

Patrick H. Beckett
Gordon Bronitsky
Hugh Davidson
Herbert W. Dick
Henry F. Dobyns
Robert C. Euler
Paul H. Ezell
William B. Griffin
Myra Ellen Jenkins
Marjorie F. Lambert

Luke Lyon
Frances Joan Mathien
Carroll L. Riley
Madeleine Turrell Rodack
Marc Simmons
Charlie R. Steen
William F. Turney
A. Helene Warren
John P. Wilson
Arnold Withers
Richard B. Woodbury

THE ARCHAEOLOGICAL SOCIETY OF NEW MEXICO: 10
Edited by Charles H. Lange
SOUTHWESTERN CULTURE HISTORY:
COLLECTED PAPERS
IN HONOR OF
ALBERT H. SCHROEDER

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Editor

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PAPERS

No. 1 Collected Papers in Honor of Lyndon Lane Hargrave. 10 papers, 170 pages, 1968. $7.00

No. 2 Collected Papers in Honor of Florence Hawley Ellis. 20 papers, 489 pages, 1975. $14.00

No. 3 Collected Papers in Honor of Marjorie Ferguson Lambert. 15 papers, 264 pages, 1976. $14.00

No. 4 Collected Papers in Honor of Bertha Pauline Dutton. 11 papers, 206 pages, 1979. OUT OF PRINT

No. 5 Collected Papers in Honor of Helen Greene Blumenschein. 12 papers, 252 pages, 1980. $14.00 (one free copy with 1979 membership)

No. 6 Collected Papers in Honor of Erik Kellerman Reed. 13 papers, 273 pages, 1981. $14.00 (one free copy with 1980 membership)

No. 7 Collected Papers in Honor of John Runyan. 9 papers, 202 pages, 1982. $14.00 (one free copy with 1981 membership)

No. 8 Collected Papers in Honor of Charlie Steen, Jr. 15 papers, 287 pages, 1983. $14.00 (one free copy with 1982 membership)

No. 9 Collected Papers in Honor of Harry L. Hadlock. 15 papers, 175 pages, 1984. $14.00 (one free copy with 1983 membership)

No. 10 Southwestern Culture History: Collected Papers in Honor of Albert H. Schroeder. 21 papers, 258 pages, 1984. $14.00 (one free copy with 1984 membership)

Members in good standing receive a 20% discount on back issues in print. Postage paid on all pre-paid domestic orders. Otherwise additional cost of postage and handling added to invoice. All foreign orders will be billed for cost of surface mail unless air mail is specifically requested.

AWANYU

(This quarterly journal was discontinued December 1977. For back issues inquire of COAS Publishing and Research, P. O. Box 3CP, Las Cruces, NM 88003)

Awanyu Newsletter

Distributed to members only. No back issues in print.
The invitation to serve as editor for this volume honoring Albert H. Schroeder brought forth rather clear-cut reactions—feelings of considerable responsibility and also feelings of genuine pleasure.

Throughout the ensuing months the responsibility involved has proved to be less burdensome than expected, thanks to the cooperation extended by officers of the Archaeological Society of New Mexico as well as by others who have ably and willingly assisted in accomplishing our common goal.

The pleasure has come from a variety of factors. The high regard generally accorded Al Schroeder has resulted in a wide and enthusiastic response to requests for articles. Several more were volunteered when colleagues became aware of the project. Equally impressive have been replies from those who found that pressures of time or prior commitments prevented them from finishing an appropriate contribution within the prescribed time frame. These reluctant turn-downs were perhaps most graphically expressed by the respondent who wrote that he had unfortunately been "caught with an empty quiver." The editor must make explicit his sincere appreciation to all those who have made a contribution to this volume—either in the form of an article or otherwise.

In planning this volume, two objectives were of primary concern. The first was to avoid a common weakness of such honorary volumes—that individual papers, while meritorious and significant in themselves, often have no unifying theme and share little, if any, common ground. The second aim was to find a unifying theme for this festschrift that would accurately reflect Al's varied interests within the special fields of studies in the American Southwest.

Accordingly, potential contributors were asked for a paper that would focus on some aspect of "Southwestern culture history." The broad scope in terms of time and space embraced by this theme seemed best to attract articles in line with Al's own long-standing interests and publications in the fields of Southwestern archaeology (both prehistoric and historic), ethnology, ethnohistory, colonial and territorial history, and related specialties.

Following the honorary Doctor of Laws degree awarded Albert H. Schroeder by New Mexico State University on May 10, 1980, in Las Cruces, this volume will hopefully gain recognition as further acknowledgment of Al's scholarly achievements and professional standing. It might be said that both the honorary degree and this volume may well fall short of the widespread recognition and high esteem gained by Al through his own research, publication, and service to others in the common effort to find answers to problems in Southwestern culture history.

Santa Fe, New Mexico Charles H. Lange

November 1983
A colleague of Al Schroeder's once remarked, "You may not agree with everything Al says, but you can be sure that his mind is constantly at work on some anthropological problem — it's always at work." A glance at the list of papers, reports, and books in Schroeder's bibliography will confirm this analysis of his character; it is an impressive one.

I first met Al Schroeder in the early spring of 1940 at Tonto National Monument. That was the time of the excavation of the Upper Ruin at Tonto; Al and two or three other students of the University of Arizona had come to see the dig and to visit with Paul Ezell who was also on that job. A little more than a year later he was an employee of the National Park Service, and thereafter our paths frequently met and finally merged with assignments in the same office.

So — to start with the beginning, Albert Henry Schroeder was born on March 23, 1914 in New York City. His family soon after moved to Ridgewood, New Jersey, and there, a few years later, an event occurred which seems to have directed his footsteps towards his future life's work — he found an Indian stone projectile point! This happened when he was 13 years of age.

Instead of putting the projectile point into a cigar box with other trinkets (the usual fate of such finds), Al took his point to someone who could tell him something about it. This was Franz Boas, one of the stalwarts of early American anthropology, who had recently retired and moved to Ridgewood.

It is seldom possible to point to a single rather minor event in a life and say, "This determined the direction of Al's life" but it certainly must have influenced his course of study.

Did someone ask what happened to the point? We do not know — it is possible that it lies in a cigar box somewhere along with a few other trinkets.

Time passed and Al entered college. He studied a year at the New Jersey Institute of Technology at Newark but then went west to the University of Arizona and studies in anthropology. There he earned the B.A. degree in 1938 and the Master of Arts in 1940. Between those degrees he worked for a summer season on a dig for the Museum of Northern Arizona; he then put in a year as foreman on a Works Progress Administration project in the Salt River Valley, Arizona. The latter job was a survey of Hohokam trash mounds and canals; this work was the basis for his M.A. thesis.

After graduation Al was employed as an archaeologist on a U.S. National Museum expedition to investigate cave sites in the state of Coahuila, Mexico. Then followed short appointments in the National Park Service at Lake Mead National Recreational Area and Wupatki National Monument.

World War II was in full swing at this time. When the United States entered the conflict, Schroeder enlisted in the army. He was stationed at Fort Lewis, Washington, and was assigned to a personnel survey team and reached the rank of Technical Sergeant. After discharge from the army he stayed on as a civilian employee to do the same sort of work until June of 1946.

During his time in the army he met, wooed, and married Ella Margaret Krienke of Olympia, Washington. From this union there are three children:
Stephen, Christine, and Scott.

At the end of the war it was back to the National Park Service for Schroeder. First there was a short tour of duty at Grand Canyon National Park and then several years as the Park Archaeologist at Montezuma Castle National Monument. One more assignment at Lake Mead and then Al's career consisted of a series of appointments to research and administrative positions to the Southwest Regional Office at Santa Fe, New Mexico, and the former headquarters office for the Southwestern National Monuments at Globe, Arizona. His last positions with the National Park Service were as Regional Interpretive Archaeologist and then Regional Chief of Interpretation. He retired from the last position in January, 1976. Official appreciation of his work is shown by the U.S. Department of the Interior Meritorious Service Award in 1956 and, in 1976, the Department's Distinguished Service Award.

Thus far, this résumé of Al Schroeder's life has been a simple outline of the principal milestones of his career. Now there must be a listing of his accomplishments and honors — this will be somewhat more difficult to present because his studies have been so varied and the times involved sometimes overlap. These are numerous enough that a few have been omitted, and it is hoped that the selection made here is more or less what Al would chose as highlights of his work. To supplement this account one should read, carefully, the appended bibliography to grasp the scope and depth of his interests and work.

Much of Al's early work with the Park Service was something of an extension of his studies in the Salt River Valley. These were an archaeological survey of the lower Colorado River and excavation of sites on the Colorado below Hoover Dam. From these studies there came several papers on pre-Columbian cultures of the western portion of the Southwest.

Land claims by Indian tribes (authorized by law) led to a series of court cases by the tribes against the federal government during the 1960s and 70s. Schroeder was asked by the U.S. Department of Justice to help prepare anthropological and ethnohistorical data for briefs and to serve as expert witness for the defense for several of the cases. He was particularly involved in suits brought by western Apachean tribes. These cases occupied much of Schroeder's time during the 1950s and 60s. He continued this work for the government in cases brought by the tribes for increased water rights during the decade of the 70s.

As time went on, Al became more involved in ethnohistorical studies and in the early entradas by the Spanish into the present Southwest. This interest resulted in a number of papers and a book (co-authored with Dan S. Matson) on the Gaspar Castaño expedition to New Mexico in 1590-91.

Another of his accomplishments is that he is a competent editor and has demonstrated that with a number of volumes — notably in this series of "Collected Papers" of the Archaeological Society of New Mexico. In addition to these volumes he has edited others for the Arizona Archaeological Society, The School of American Research, and the Santa Fe Corral of The Westerners.

This seems an impressive array of abilities and accomplishments, but we have not yet finished.

Al has joined a number of professional societies, and it appears that virtually every one of them has seen fit to elect him to its board of trustees, or whatever its governing body is called, and to an administrative position. To run down the list:

- Historical Society of New Mexico. Member, 1948 to the present; Vice-President 1975-79, President 1979-83.
. Old Santa Fe Association, Board of Trustees, 1966–72.
. Governor of New Mexico’s Cultural Properties Review Committee, Chairman, 1969–81.

Some other societies with which Schroeder has been associated are The Society for American Archaeology, The Museum of Northern Arizona (Research Associate), Arizona Academy of Science (Charter Member), Spanish Colonial Arts Society, Historical Society of Santa Fe, Picuris Pueblo Advisory Committee, and Museum of New Mexico (Editorial Board, 1968–70).

Just as one feels that this man has reached a climax in his career he pops up with another honor or accomplishment. At the present time the top honor has come from New Mexico State University which, on May 10, 1980, awarded Albert H. Schroeder with the degree of Doctor of Laws.

One final note: the foregoing account of Al Schroeder's life and achievements might create a picture (in the mind of one who does not know him) as a stoop-shouldered grind of a student, difficult to pull away from the desk. On the contrary, he is an easy-going affable man, an avid golfer and bowler, and a lover of fine foods – particularly of Italian foods for, in spite of his Germanic name, he is of Italian descent.

PERSONAL AND PROFESSIONAL BACKGROUND

ALBERT H. SCHROEDER

Born: March 23, 1914, New York City.
Higher Education:
1938—B.A. degree, Archaeology, University of Arizona.
Children: Stephen, Christine, and Scott.
Major interests: Archaeology, Ethnohistory, Historical Archaeology, Spanish Period History—all dealing primarily with the Southwestern United States.

PROFESSIONAL BACKGROUND

Summer 1938
Field archaeologist, Museum of Northern Arizona, Flagstaff, Arizona (field excavations)

Oct. 1938 to Sept. 1939
Archaeological foreman, University of Arizona—W.P.A. Project, Phoenix, Arizona (field excavations and laboratory supervision)

Sept. 1940 to July 1941
Field archaeologist, U.S. National Museum Field expedition, Coahuila, Mexico (Field excavations)

Aug. 1941 to Oct. 1941
Jr. Archaeologist, U.S. National Park Service, Lake Mead (ranger and pottery research work)

Oct. 1941 to Dec. 1941
Park Ranger Naturalist, U.S. National Park Service, Wupatki (archaeological stabilization project)

Feb. 1942 to Aug. 1942
Investigator, Retail Credit Company, Los Angeles (credit and personnel investigations)
Sept. 1942 to March 1946
Interviewer, classifier, personnel survey audit team, and last as chief counselor, U.S. Army (personnel work throughout)

March 1946 to June 1946
Training and Orientation Officer, civilian employee, U.S. Army (same as above, chief counselor with added duties)

June 1946 to Oct. 1946
Ranger-naturalist, U.S. National Park Service, Grand Canyon (ranger work)

Nov. 1946 to Jan. 1950
Archaeologist, U.S. National Park Service, Montezuma Castle (archaeological and ranger work)

Feb. 1950 to Oct. 1951
Archaeologist, U.S. National Park Service, Lake Mead (archaeological excavations and survey)

Oct. 1951 to Sept. 1954
Archaeologist, U.S. National Park Service, Region Three Office, Santa Fe (archaeological and historical research and administrative work)

Sept. 1954 to May 1957
Staff archaeologist, U.S. National Park Service, Southwestern National Monuments, Globe (administrative work and archaeological and historical research)

June 1957 to Dec. 1967
Archaeologist, U.S. National Park Service, Southwest Regional Office, Santa Fe (archaeological and historical research and administrative work)

Jan. 1967 to 1973
Regional Interpretive Archaeologist and Interpretive Specialist, U.S. National Park Service, Southwest Regional Office, Santa Fe.

Chief, Division of Interpretation, U.S. National Park Service, Southwest Regional Office, Santa Fe.

Member, Society of American Archaeology, 1938-72

Research Associate, Museum of Northern Arizona, 1947-71

Member, Historical Society of New Mexico, 1948 to date. Vice-president, 1975-79; President, 1979 to date.

Expert Witness, U.S. Department of Justice, for Indian Land Claims Hearings, 1953-65; for Tewa Indian Water Claims Hearing, 1967-78

Charter Member, Arizona Academy of Science, 1955-56

Interim Chairman, Pecos Conference, 1957

Member, Spanish Colonial Arts Society, 1958-64

Chairman, Ethnohistory Session, First Conference, History of Western America, Oct. 1961

Southwestern Editor, New World Abstracts, 1962-65

Charter Member, Westerners Corral, Santa Fe, New Mexico, 1962 to date (Program Chairman, 1965; President, 1968; Editor, 1970 to date)

Member of the Board of Managers, School of American Research, Santa Fe, New Mexico, 1965-71

President, Archaeological Society of New Mexico, 1965-71; Trustee, 1965-73; Advisory Consultant, 1973 to date

Member of the Board of Trustees, Old Santa Fe Association, Inc., 1966-72

Governor of New Mexico's Cultural Properties Review Committee - Chairman, 1969-81

Advisor to Southwestern Society for Indian Archaeology (California) 1967-68

Member, Historical Society of Santa Fe, 1967-70, 1981 to date

Member of the Picuris Pueblo Advisory Committee, 1967-77

Member of planning committee for annual meeting of Society for American Archaeology - 1968

Member of Editorial Board, Museum of New Mexico, 1968-70

Editor, La Gaceta, El Corral de Santa
Fe Westerners, 1970 to date
Editor, Brand Book, El Corral de Santa Fe Westerners, 1971-73
Member of Advisory Committee, Southwest Section, Handbook of the North American Indian, Smithsonian Institution, 1971 to date
Member of Advisory Council in Anthropology, Careers in Science, Manzano High School, Albuquerque
Member of Know New Mexico Bicentennial Committee, 1973-77
Member of Historic Preservation Panel, New Mexico Arts Commission 1973-75
Lectures presented before the Historical Society of Santa Fe, various service organizations, School of American Archaeology Series, various schools, National Park Service Training Center, Western International Forest Disease Work Conference, Archaeological Societies
Participant in various Southwestern ceramic conferences, School of American Research Advanced Seminar
Reader for the University of Kentucky Press (1965), School of American Research (1968), Museum of New Mexico (1968), Prescott College (1968), New Mexico Historical Review (1969), New Mexico Magazine (1970), Southwestern Parks and Monuments Association (1965 to date), School of American Research (1976 to date)
Presented two seminars on Archaeology and Vandalism at the 1978 National Trust for Historic Preservation Annual Meeting
Member, BLM Albuquerque District Multiple Use Advisory Board, 1976-77
Exofficio Member, Board of Directors of Rio Grande Historical Collections, New Mexico State University, 1979-83
Awards
Department of the Interior — Meritorious Award - 1956
Department of the Interior — Distinguished Service Award - 1976

FIELD EXPERIENCE

Excavation in sites in the Phoenix area; north of Williams, Arizona; South Rim of Grand Canyon; Kinishba Ruin near White River, Arizona; Forestdale, Arizona; Verde Valley, Arizona; Willow Beach, Arizona; Petrified Forest National Park, Arizona; Apache Creek-Reserve area, New Mexico; Guadalupe Mountains, Texas; Natural Bridges National Monument, Utah; and Coahuila, Mexico
Archaeological surveys in the Moapa Valley of southern Nevada; Zion National Park, Utah; along the lower Colorado River from Hoover Dam to the International Border; along the lower Gila River, Arizona; Hovenweep National monument, Utah-Colorado; Apache Creek-Reserve area, New Mexico; Cochiti Reservoir, New Mexico; Wupatki National Monument, Arizona; Shivwits Plateau in Lake Mead National Recreation Area; Verde Valley, Arizona; Buckeye-Higley region, Arizona; and various road lines in National Park Service areas
Listed in the following directories: (first appearance)
  • International Directory of Anthropologists (1950)
  • The Social and Behavior Sciences (1956)
  • Leaders in American Science (1969-1971)
  • Who's Who in the West (1970)
  • National Directory of Latin Americanists (1969)
  • Dictionary of International Biog-
PUBLICATIONS

. Comment on Reed's 'Transition to History in the Pueblo South-


1955


- Ball Courts and Ball Games of Middle America and Arizona. Archaeology 8(3): 156-161.

1955-56


1956


1957


- Book Review: An Archeological Survey of West Central New
Mexico and East Central Arizona, by Edward Bridge Danson. El Palacio 64(11-12): 381-382.

1958


1959

Pottery Types of the Southwest. Edited by Harold S. Colton. Museum of Northern Arizona Ceramic Series, No. 3D (Lower Colorado Buff Ware).

A Study of Yavapai History. U.S. Department of Justice (Multilithed).


Part II - The Jicarilla Apaches. U.S. Department of Justice (Multilithed).

1960


The Hohokam, Sinagua, and Hakataya. Archives of Archaeology, No. 5. Society for American Archaeology and the University of Wisconsin Press, Madison.

1961


1962


1963


A Study of the Apache Indians - Part V - The Tonto and Western Apaches. U.S. Department of Justice (Multilithed).

1964


Book Review: Historical Sites in Glen Canyon, Mouth of Hanson Creek to Mouth of San Juan River by C. Gregory Crampton. American Antiquity 29(4): 529.


The Language of the Saline Pueblos - Piro or Tiwa? New Mexico Historical Review XXXIX(3): 235-249.

Comments by Albert H. Schroeder on "The Route of James O. Pattie on the Colorado in 1826": A Reappraisal by A. L. Kroeber. Arizona and
1965


1966


1967

1968
- Editor - Collected Papers in Honor of Lyndon Lane Hargrave. Papers of the Archaeological Society of New Mexico 1. Santa Fe.
- Birds and Feathers in Docu-


- Tentative Ecological and Cultural Forces and Their Effects on Southwestern Indian Farmers. In Contributions to Southwestern Prehistory, Vol. IV, Proceedings, VII Congress International Association for Quaternary Research, Eastern New Mexico University Contributions in Anthropology 1(1), Portales.


1969


1970

- Editor, La Gaceta, El Corral de Santa Fe Westerners V. Santa Fe.


1971

- Packing into the Past. New Mexico Magazine 49(5-6): 24-29, 47-50.


1972


- Book Review: Southwestern New Mexico Research Reports, Nos. 1-6, Department of Anthropology, Case Western Reserve University, 1971. El Palacio 78(3): 37.


1973


Riley. Ethnohistory 20(2).


. People of the Hidden Valley: Guide Book to Picuris Pueblo, N.M. Bureau of Indian Affairs, Santa Fe.


. A History of the Area Along the Eastern Line of the Santo Domingo Pueblo Aboriginal Title Area. Prepared for the U.S. Department of Justice. Ms. in Museum of New Mexico, Santa Fe.

. The Revolutions of the 1600s. La Cronica de Nuevo Mexico, No. 2, December, pp.2-3.


. Comments on Plaintiff’s Exhibit 1, "The Basis for Santo Domingo Pueblo’s Claim to the Turquoise Mine Area," prepared for the U.S. Department of Justice. Ms. in Museum of New Mexico, Santa Fe.


. Book Review: Meaning in An-


The Rodriguez Expedition of the 1580s. La Cronica de Nuevo Mexico, No. 10, pp. 3-4. Historical Society of New Mexico.


In Press


THREE CIRCLE RED-ON-WHITE:
AN ALTERNATIVE TO OBLIVION

ARNOLD WITHERS

Dear Al: Most of the pottery types that I have ever been interested in, like some race horses, have been completely without ambition. A melancholy case.

Almost fifty years ago Emil W. Haury published the first definition of the Mogollon Culture of southwestern New Mexico, and the pottery types associated with it (Haury 1936b; 1936a). Subsequent excavations in the area have generally substantiated the analysis, interpretations, and conclusions of Dr. Haury and his colleagues at Gila Pueblo. Some refinements have been made in more recent years, and others are in the process of being made today.

Yet over the years I have become increasingly puzzled by the intermediate historical position and the time span accorded one of the most obscure types of decorated pottery in the Southwest: Three Circle Red-on-white. From an innocent and intelligent beginning there has developed a small body of thinking about this pottery type which is becoming almost a fundamentalist approach to some ideas about which I know Dr. Haury never dreamed would become dogma.

Three Circle Red-on-white was possibly first described by Hough (1919: 422) as "another variety [of pottery] of coarse, brown paste washed with white and decorated with red brown is represented by two fragments." He also illustrated, in Figure 36, a bowl with "brown paste, plain on exterior, washed with white on the interior and decorated in brown."

Apparently Bradfield (1927: 556) was the next to focus any attention on this pottery type. He was writing about the pottery which later came to be known as Mogollon Red-on-brown and described:

... early red bowls, well polished, sometimes crudely decorated with red lines inside, having a rubbed corrugated or "blind" corrugated on the outside, are succeeded by a number of variations in type. A definite white slip is introduced on the interior only, while it still carries the same paste, development of design and other workmanship features of the early type.

The first use of Mogollon Red-on-brown and Mangus [sic] Black-on-white was made by the Gladwins (1934: Fig. 3). The revelation of Three Circle Red-on-white had not yet appeared, but the term was first used here (ibid., Fig. 6) as a phase designation with Mogollon Red-on-brown and "Mangus" Black-on-white given as the signature decorated types. The Gladwins (1935: 222) had first identified Mogollon Red-on-brown at Mogollon Village in 1931 and had found the same pottery to be "quite abundant" at Bradfield's Three Circle Site in the Mimbres Valley. It was here (pp. 231-232) that the Gladwins decided from associated pottery types that Mogollon Village was contemporary with Basketmaker III and that pithouses at Cameron Creek and the Three Circle Site overlapped in time with those at Mogollon Village but had a much higher frequency of Mimbres wares (i.e., black-on-white pottery). They felt (p. 274) that Bradfield's Three Circle Site was later than the Mogollon Village because they believed that while red-on-brown ware
still persisted at the Three Circle Site, there was a marked increase in black-on-white pottery (by which was meant the Mimbres Bold Face Black-on-white of the Cosgrove's Swarts Ruin report (1932).

But it remained for Dr. Haury (1936a) assisted by the staff at Gila Pueblo to name this pottery and publish the first type description. Three Circle Red-on-white had not been recognized when the Mogollon Village was excavated (Haury 1936b: 102 fn). Earlier the term Mogollon Red-on-white had been used as a laboratory designation at Gila Pueblo. Finally, this variation of Mogollon Red-on-brown was adorned with the name of Bradfield's Mimbres Valley site (and incidently the ranch on which the site was located). Still later, Colton (1953: 75) used the name Three Circle Red-on-terracotta.

Haury (1936b: 96) set the stage for the story of a developmental sequence when he wrote about Mogollon Red-on-brown and Three Circle Red-on-white on the basis of reasonable evidence that:

their decline in the upper layer of the rubbish test and in Three Circle Phase houses is made clear by the tremendous increase in a new type, Mimbres Bold Face Black-on-white. It is new, however, only in the sense that it evolved from the preceding two types with the adoption of some outside elements, as typologically it carries forward an established tradition.

And again (p. 102):

To be specific, Bold Face Black-on-white, genetically related to Mogollon Red-on-brown through Three Circle Red-on-white, is a type belonging strictly to the Mimbres area.

Haury (1936a: 20) had also written about Three Circle Red-on-white, noting that "This type is clearly a transitional form which relates the black-on-white development in the Mimbres to the red-on-brown tradition."

So much for 1936. Now let us look at the present state of the art of interpreting early Mimbres area ceramics to see how much we have learned. The most recent statement on this question came from Steven A. LeBlanc (1982: 114), who clarified and reinforced Haury's early speculations with an up to date summation of the evidence, ending with this conclusion:

Nevertheless, all evidence that exists for the Mimbres Branch strongly supports the idea that there was a sequence type evolution up until A.D. 1150. Data from other branches is much weaker, but there is no information to refute the idea that all painted pottery series represent gradual evolutions. That is, it seems clear in the Mimbres Branch that Mogollon Red-on-brown became Three Circle Red-on-white which became Bold Face Black-on-white by the slow adoption and replacement of color schemes, design elements, etc.

Also Brody (1977: 82-83) has written in recent years on the same theme, "Three Circle Red-on-white replaced Mogollon Red-on-brown in these same Regions during the ninth century... " and:

More complex and refined than any earlier designs, the Three Circle Red-on-white system, with its curvilinear and interlocking elements and suggestion of positive and negative duality, presages both later Mimbres Black-on-white types.

Part of that may be right. It's the verb that raises a doubt. Brody (Pl. 3) illustrated a Bold Face Black-on-white jar which he labeled Three Circle Red-on-white. This confusion
probably accounted for his statement.

Haury inadvertently laid his booby trap about the life span of Three Circle Red-on-white while attempting to interpret the evidence of his two pioneer Mogollon sites, Mogollon Village where it had a "very meager representation," and the Harris Village where there was an "abundance" of the type (Haury 1936b: 102). So, Haury (1936a: 20) wrote:

only small amounts of it were found in both San Francisco and Three Circle Phase houses at the Harris Site. It is consequently believed to have existed for a comparatively short period.

And he also said (1936b: 102 fn):

It should be explained that Three Circle Red-on-white is a short-lived type occurring between the peaks of production of Mogollon Red-on-brown and Mimbres Bold Face Black-on-white.

Most students of Mogollon ceramics have loyally followed Haury's initial ideas on this. Most recently, we have the example of Masse (1982: 89):

LeBlanc would restrict the manufacture of Mogollon Red-on-brown to approximately A.D. 650-750 and sees Three Circle Red-on-white as a short-lived transitional pottery type that lasted no longer than a couple of generations around 750. Three Circle is then rapidly replaced by Bold Face Black-on-white, the latter persisting until A.D. 900. LeBlanc's dates appear to be firmly established for the Mimbres material. [Masse, in a long bibliography, gave no reference to this.]

And Brody (1977: 82) wrote that "Three Circle Red-on-white was short lived and may not have been made in as large an area as was Mogollon Red-on-brown."

Current thinking on these minor problems was probably summed up best by LeBlanc (LeBlanc and Whelan 1980):

It was not until Haury's (1936a, 1936b) definition of the Mogollon and the three phases of pithouse architecture with the corresponding ceramic and artifactual changes, that a clear and meaningful sequence was established. These were Georgetown, San Francisco, and Three Circle Phases (p. 145).

Between every period a certain amount of time must be given as an overlap where two ceramic types will occur together. For example, the beginning of the Three Circle Phase around A.D. 750 will obviously still be a time when some Mogollon Red-on-brown was in use, although we would expect the Mogollon Red-on-brown to soon "die out." Three Circle Red-on-white is still regarded as a short lived transitional style between Mogollon Red-on-brown and Bold Face Black-on-white as defined by Haury (1936b) [sic]. We could therefore expect to see the use of Three Circle Red-on-white perhaps for as long as 40 years or from ca. A.D. 730 to 770 overlapping both the production of Mogollon Red-on-brown and Bold Face Black-on-white (p. 161).

Just as Haury's phase sequence is adequate for present purposes, so is his sequence of slipped and painted ceramic types from San Francisco Red through Bold Face Black-on-white. Each of these types [sic] appear to represent parts of a long lived, indigenous, ceramic tradition which culminated with Mimbres Black-on-white (p.149).
A glance at Figures 1 and 2 will indicate that something may be wrong with these interpretations. I really can't see much to show that Mogollon Red-on-brown preceded Three Circle Red-on-white or that Three Circle Red-on-white was earlier than Mogollon Red-on-brown.

Everyone seems to agree with the opinion that the dates from the SU Site (Fig. 2) are not to be taken seriously in terms of the ceramics. We are left with House 28 at the Harris Village in the Mimbres Valley (Haury 1936b: 58). This structure has been dated at A.D. 624v (Bannister, et al. 1970: 64). Bannister commented that the Harris Village dates followed the sequence of the Mimbres Mogollon very well with the Georgetown Phase ending in A.D. 624 and the San Francisco Phase beginning the same year. This dating has in a general way been followed by others.

The only decorated pottery with a floor-fill association found in House 28 at the Harris Village totaled four sherds of Mogollon Red-on-brown. I submit that it is unsportsmanlike to use these four little sherds to establish such a rigid boundary between the Georgetown and San Francisco Phases. It reminds me of the old song by Bert Kalmar and Harry Ruby (1931).

Haury himself warned about this (1936b: 79):

> However, since it is entirely possible that late sherds may drift downward into early rubbish and early sherds persist upward into later deposits to introduce extraneous material, it is necessary to disregard these in favor of the predominating type or types. Whole vessels on the floor are naturally very desirable for dating. It is true that no Three Circle Red-on-white was found in this house. However, at Twin Bridges (Fig. 1) no Mogollon Red-on-brown was found anywhere on the site. No one has ever formulated an argument about this (although some have probably used this circumstance to reinforce in their own minds the mistaken notion that Mogollon Red-on-brown was on its way out by then).

Aside from House 28 at the Harris Village, the only other pre-700 date for Mogollon Red-on-brown came from House 203 at the Cerro Colorado Site (Wasley 1959: 88). The latest date associated with this house was 691vv (Bannister, et al. 1970: 19) which seemed acceptably close to an arbitrary A.D. 700 date for the beginning of Mogollon decorated pottery. I am using only tree ring dates and ignoring radiocarbon dates of A.D. 340-2200 from Bat Cave (Dick 1965: 21, 62-64) and of A.D. 620-130 from a site in the Burro Mountains (Fitting 1971: 5-7) and probably others.

It seems to me that the first dates which may be seriously considered cluster in the early 8th century. At the Harris Village House 18, dated to sometime after A.D. 708 (Fig. 1), showed a plentiful supply of both Three Circle Red-on-white and Mogollon Red-on-brown. Then there is a less strong but comparable situation in House K at the Starkweather Ruin (Fig. 1). But easily the best of these early dates came from House 201-A at Cerro Colorado (Wasley 1959: 109) which yielded the bark date of A.D. 734 and another cutting date of 737 (Bannister, et al. 1970: 19). On the floor of this house were found a Mogollon Red-on-brown seed jar, a Three Circle Red-on-white bowl, and a White Mound Black-on-white bowl, as well as sherds. I will mention that another well-dated structure was House 4 at Mogollon Village (Haury 1936b: 18) with a date of A.D. 738v (Bannister, et al. 1970: 49) and no decorated pottery on the floor except three sherds of Mogollon Red-on-brown.

Wheat (1955: 172) solved the puzzle of the early dates for Starkweather
<table>
<thead>
<tr>
<th>DATE</th>
<th>SITE</th>
<th>PROVENIENCE</th>
<th>MOG. R/BR</th>
<th>3 CIRCLE R/W</th>
<th>B/F. B/W</th>
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<tr>
<td>877</td>
<td>Harris Village</td>
<td>House 10</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>2 Chart, p.81 solid date</td>
</tr>
<tr>
<td>856vv</td>
<td>Harris Village</td>
<td>House 17</td>
<td>+</td>
<td>+</td>
<td>2</td>
<td>No mention in description, p. 162, chart, p.81, shows presence</td>
</tr>
<tr>
<td>853vv</td>
<td>Wheatley Ridge</td>
<td>House 1</td>
<td>0.9%</td>
<td>10.1%</td>
<td>7%</td>
<td>8 Presence</td>
</tr>
<tr>
<td>853r</td>
<td>Wheatley Ridge</td>
<td>House 4</td>
<td>1</td>
<td>12</td>
<td>8</td>
<td>Latest date 860vv indicating that this pottery continuing</td>
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<tr>
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<td>Wheatley Ridge</td>
<td>House 3A</td>
<td>7.5%</td>
<td>3.1%</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>797vv</td>
<td>Site 30, Little Colorado, Arizona</td>
<td>Pithouse G</td>
<td>2</td>
<td>8</td>
<td>7</td>
<td>If true, this and Cerro Colorado northernmost occurrences</td>
</tr>
<tr>
<td>797vv</td>
<td>Turkey Foot Ridge</td>
<td>House F</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>797vv</td>
<td>Turkey Foot Ridge</td>
<td>House E</td>
<td>9</td>
<td>22</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td>797r</td>
<td>Twin Bridges</td>
<td>House D</td>
<td>6</td>
<td>11</td>
<td>6</td>
<td>Good date plus whole vessel on floor</td>
</tr>
<tr>
<td>797v</td>
<td>Turkey Foot Ridge</td>
<td>House B</td>
<td>26</td>
<td>55</td>
<td>52</td>
<td>5</td>
</tr>
<tr>
<td>775vv</td>
<td>Turkey Foot Ridge</td>
<td>House K</td>
<td>3</td>
<td>19</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>769r</td>
<td>Starkweather Ruin</td>
<td>House I</td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>3 Strata 3, 4</td>
</tr>
<tr>
<td>752vv</td>
<td>Turkey Foot Ridge</td>
<td>House O</td>
<td>1</td>
<td>8</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>734rB</td>
<td>Cerro Colorado</td>
<td>201-A</td>
<td>5</td>
<td>6</td>
<td>4</td>
<td>Plus association of whole vessels and best early date</td>
</tr>
<tr>
<td>718vv</td>
<td>Starkweather Ruin</td>
<td>House K</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>Stratum 4</td>
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<tr>
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<td>Harris Village</td>
<td>House 18</td>
<td>24</td>
<td>18</td>
<td>4</td>
<td>2</td>
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</table>

Figure 1: Best Dates for Three Circle Red-on-white with Floor Counts of Sherds.

Reference
2. Haury, E. W., 1936b, p. 132
3. Nesbitt, P. H., 1938, pp. 17 & 87
4. Wasley, W. W., 1959, pp. 109, 63-64
5. Martin, P. S., and J. B. Rinaldo, 1950
8. Rowe, C., 1947, pp. 41, 45, 56
House I, Turkey Foot Ridge, House B, and Twin Bridges, House D (Fig. 1) by stating that they were built in the San Francisco Phase but occupation continued into the Three Circle Phase and that this "unquestionably accounts for the early dates." I could never understand this interpretation; it was really tailoring the evidence to make it fit the story.

There are only two excavated sites where Three Circle Red-on-white outnumbered other decorated pottery types (this ignores Twin Bridges, Fig. 1, where the amount of decorated pottery was very small). One of these is the Turkey Foot Ridge Site where the excavations provided 724 sherds of Three Circle Red-on-white, 572 sherds of Bold Face Black-on-white, and 225 sherds of Mogollon Red-on-brown (Martin and Rinaldo 1950: Table 10, p. 366). The dates at this site extended from 752vv to 788vv. Bannister believed that most house construction took place within a few years after A.D. 780 (1970: 58). The other is the apparently later Wheatley Ridge Site, which was excavated by Paul Nesbitt for the Logan Museum in 1939 and reported on by Chandler Rowe (1947). Here again the most numerous decorated type was Three Circle Red-on-white with 407 sherds along with 61 Bold Face Black-on-white sherds, and 55 Mogollon Red-on-brown sherds (p. 32) and no other painted pottery (Bluhm 1957: 36, Fig. 13). Bannister (1970: 59) thought most construction activity took place at Wheatley Ridge between A.D. 850 and 900.

A terminal date for this pottery

<table>
<thead>
<tr>
<th>DATE</th>
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<th>ASSOCIATIONS</th>
</tr>
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<tr>
<td>1249r</td>
<td>Higgins Flat Pueblo</td>
<td>Room A</td>
<td>7</td>
<td>Mogollon R/Br</td>
</tr>
<tr>
<td>1232vv</td>
<td>Higgins Flat Pueblo</td>
<td>Room B</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>1071r</td>
<td>Site 188, Mariana Mesa</td>
<td>Surface</td>
<td>6</td>
<td>White Mound B/W, Kiatuthlanna B/W</td>
</tr>
<tr>
<td>919vv-979vv</td>
<td>Taylor Draw</td>
<td>Pithouses</td>
<td>5</td>
<td>Red Mesa B/W</td>
</tr>
<tr>
<td>635vv</td>
<td>Harris Village</td>
<td>House 22</td>
<td>4</td>
<td>Mogollon R/Br, Bold Face B/W</td>
</tr>
<tr>
<td>481vv</td>
<td>SU Site</td>
<td>Pithouse D</td>
<td>3</td>
<td>Neck-banded and scored jars</td>
</tr>
<tr>
<td>436vv</td>
<td>SU Site</td>
<td>Pithouse W</td>
<td>2</td>
<td>Red Mesa B/W, Mimbres B/W</td>
</tr>
</tbody>
</table>

Figure 2: Dates to Ponder for Three Circle Red-on-white.

Reference
3. Martin, 1940, pp. 22, 83
4. Haury, 1936b, p. 81
5. Peckham, S., 1976, p. 51
6. Danson, E. B., 1957, Table 14, p. 71
7. Martin, et. al., 1956, p. 138
is difficult to designate. As LeBlanc (1977: 8) has pointed out, there are no guiding tree ring dates in the Mimbres area for the 10th century. Breternitz (1966: 32) used the date of A.D. 951 as the end date for Three Circle Red-on-white. Of necessity he was using the best available evidence, a date of Gladwin's for Wheatley Ridge. However, the Tree Ring Laboratory has revised these dates, and Bannister (1970: 59) gave A.D. 899 as the latest cutting date on the site. This date applied to House 5 for which we have no good information about the pottery. Rowe (1947) only reported that it contained "enough" black-on-white to be labeled a Three Circle Phase house. The implication was that there was other decorated pottery in the house, perhaps either Three Circle Red-on-white or Mogollon Red-on-brown or both. Perhaps the best dates associated with this pottery were from House 4 at Wheatley Ridge (Rowe 1947: 41, 56): A.D. 853r and 860vv (Bannister 1970: 59) and where the floor-fill sherds were reported to be heavy on Three Circle Red-on-white with Bold Face Black-on-white absent.

If this is really the best end date for this pottery type, it is almost 100 years earlier than the date Breternitz had to use. My guess is that ever since the report of the Tree Ring Laboratory in 1970 we have been in the position of being able to equate, more or less, Three Circle Red-on-white and the Anasazi period of Pueblo I or with a time span of ca. A.D. 725-875 (which I consider to be a very conservative estimate at both ends). So we have no dates indicating that Three Circle Red-on-white survived into the 10th century, although briefly it may have. Haury (1936b: 117) said about the same thing for the San Francisco Phase.

This leaves open the likely possibility that Mogollon Red-on-brown may have had a longer life than Three Circle Red-on-white. House 2 at Mogollon Village produced five Mogollon Red-on-brown sherds from the floor (Haury 1936b: 101) and the best date from the site at A.D. 898r (Bannister, et al. 1970: 48). This would imply that the pottery type continued into the 10th century for at least a few years. However, one must remember that Three Circle Red-on-white had not yet been distinguished as a type when the Mogollon Village was excavated (Haury 1936b: 102 fn). Breternitz (1966: 89) stated that it lasted until at least A.D. 950. But this date seems to have been erased by the revision of the Wheatley Ridge Site dates (Bannister, et al. 1970: 59). None was found in the northern sites of Cerro Colorado in House 410, thought to be slightly earlier than the Williams Site (Wasley 1959: 135) or at the Williams Site (Smith 1973) with dates of about A.D. 950-1015 (Bannister, et al. 1970: 17). The Mogollon Red-on-brown pottery found at Snake-town was placed by Haury (1976: 328) in the late Gila Butte and Santa Cruz Phases, and at that time he seemed to favor (p. 330) an even earlier demise of the type when he suggested that with current tree ring evaluation "an age of about 625 to 850 fits much better."

I think that this is a problem still looking for a final answer and blessed be he that giveth! But it is of interest partly because the disappearance of Mogollon Red-on-brown has had a strong influence upon the determination of a terminal date for the San Francisco Phase (as its appearance has had for an evaluation of the beginning of the phase).

At any rate, it is difficult to demonstrate the survival of Three Circle Red-on-white into the block of time designated as the 10th century. Some of the reported later occurrences of this type have made one suspicious of identifications based perhaps too much on color. For example, Three Circle Red-on-white was reported
from the Tularosa Phase site of Apache Creek Pueblo (Martin, et al. 1957: 105) but Peckham (1956: 40) found none when he excavated pit-houses on the same site. Similarly, Three Circle Red-on-white was reported from Higgins Flat Pueblo (Fig.2 and Martin, et al. 1956; 1957). Further, as a footnote to all of this, I believe that it is appropriate to suggest that Three Circle Red-on-white was probably the earliest pottery type in the Southwest to exhibit a white slip. The only serious challenger to this would be Trincheras Polychrome (DiPeso 1956: 362; Withers 1944: 42; 1973: 43ff). This type is not well dated, but there has never been a suggestion that its appearance preceded A.D. 800. In southeastern Arizona two other types carrying a white slip seem to be somewhat later, Cerros Red-on-white (Sayles 1945) and Tres Alamos Red-on-brown (Tuthill 1947).

On the Colorado Plateau the first appearance of a white slip among the Anasazi seems to have been with Kiatuthlanna Black-on-white. Roberts (1931: 120) told about this:

... the non culinary vessels of the pithouse group show the presence of a slip on only 24.5 per cent of the specimens. This may be attributed to two factors. One is that the people were adopting the feature but that it had not yet become an outstanding characteristic. The other is that its development was retarded somewhat by the unusually fine quality of the clay. The latter made possible smooth surfaces and a good light background without the addition of "liquid clay" to which some light coloring matter, such as kaolin, had been added.

It would be difficult to place Kiatuthlanna Black-on-white any earlier in time than A.D. 800.

Farther north this trait first appeared in the Chuska Valley and along the lower Chaco River on a related type named Drolet Black-on-white (Windes 1977: 310) which is believed to have been made in the area between A.D. 825 and 900 (Peckham and Wilson n.d.). In the carbon paint series of this Chuska White Ware the earliest white slip has been found on Tunicha Black-on-white (the local variety of Kana-a Black-on-white) which has been dated A.D. 850-900 (p. 313).

Piedra Black-on-white was the first painted pottery to show a white slip in the Mesa Verde area, and apparently this started rather late in its lifetime. Hayes (1975: 114) reported that "a covering slip was introduced with this ware, appearing on 1.5 percent of the specimens from Site 1676 and on 23 percent of the later sherds from Feature 7 and Stratum E at Badger House." He further described the situation here by saying that Chapin Black-on-white was entirely supplanted by Piedra in the last quarter of the 800's. Some terminal Piedra Black-on-white continued to be manufactured in the very early part of the Ackmen Phase. The lower levels of Badger House indicate that, probably about A.D. 900 Piedra was in the process of becoming Cortez Black-on-white at the same time that changes in the utility pottery made Mancos Gray out of Mocasin.

Hayes (p. 186) elsewhere confirmed this south to north progression when he concluded that:

The style of Whitemound and Kiatuthlanna Black-on-white appears on the Puerco in the late 700's but did not become the fad north of the San Juan until 100 years later, when it shows up on Piedra and early Cortez Black-on-white.
Others have written about this passage of ceramic traits from south to north. Perhaps the most recent statement is that of Schroeder (1982: 308). One old and important pathway used for this movement of ideas was from the Mimbres area across the Gila River, up Duck Creek and the San Francisco River to the Zuñi area and on to the Mesa Verde and Four-corners region. Nor did this route of travel end with the southern boundary of New Mexico. At that time the Mogollon area extended well into Chihuahua. Breternitz (1982: 141) has commented succinctly on some of the difficulties involved with speculations about this.

One roadblock to the understanding of Three Circle Red-on-white has been the fact that there was very little of it made, anywhere, anytime. The same would be true for Mogollon Red-on-brown, although the total production of this type may have exceeded that of the former, but not by much. The cross-dating, like the dendrochronological evidence, indicates a considerable life span for Three Circle Red-on-white when we see it in the company of White Mound Black-on-white at Cerro Colorado (Fig. 1) and Encinas Red-on-brown at Crooked Ridge Village (Wheat 1954: 91).

The myth of an evolution of these early Mogollon pottery types may now be laid to rest, I hope. I might mention that I have been unable to discover any Mogollon site with painted pottery present where black-on-white pottery was absent, but that is another long story.

I think that it would be appropriate to view Three Circle Red-on-white as a legitimate type in the lexicon of Southwestern prehistoric painted pottery, but as a variant of Mogollon Red-on-brown. We have an abundance of information about the work of the modern Pueblo Indian potters, but there has been little effort to project this into the past (perhaps properly as there were not as many museums or tourists then). One may view the catalogue of the museum exhibit called "Families in Pueblo Pottery" (Campbell 1974) to see the varieties made by the same people, particularly the Martinez family in San Ildefonso. Maria and her co-workers made red-on-red, black-on-black, and Tewa Polychrome with no wonderment about the future of archaeology in that locality. I offer without hesitation the opinion that Mogollon Red-on-brown and Three Circle Red-on-white were being made in the same villages in the southwestern New Mexican Mogollon area at the same time during the 8th and 9th centuries.

ACKNOWLEDGMENTS

Sincere thanks are due to Stew-art Peckham, whose interest in prehistoric Southwestern ceramics always leads him to give sympathy and encouragement to others.

Santa Fe, N.M.

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DISTRIBUTION OF CHUPADERO BLACK-ON-WHITE: OR THE BLACK AND WHITE OF JUG USE

PATRICK H. BECKETT

The wide distribution of Chupadero Black-on-white throughout a vast geographical region in New Mexico, west Texas, and northern Mexico has been known for years. Mera (1931), in his description of Chupadero Black-on-white, also provided a geographical range of its distribution. Later, in 1935, Mera enlarged the area "... to include localities on certain eastern drainages of the Rio Pecos in Guadalupe County" (Mera 1935: 30). By the time Hawley's (1936) book on southwestern pottery types was published, the range had been extended into the Chihuahua basin and from El Paso, Texas, west to Deming, New Mexico. Thus, except for the Salinas area, the range of Chupadero Black-on-white had now reached the approximate limits of Lehmer's (1947) Jornada Branch of the Mogollon, although Lehmer ignored Mera's 1938 data on southeastern New Mexico which indicated brown wares and Chupadero Black-on-white were present in that region. In 1965, Corley introduced the "Proposed Eastern Extension of the Jornada Branch of the Mogollon." This expanded Jornada Mogollon area, except for the northern boundary, was also the approximate limits of Chupadero Black-on-white except for isolated trade wares. Since then, virtually every excavation or major survey in eastern New Mexico, west Texas, and northern Chihuahua has included Chupadero Black-on-white in its material culture inventory.

Due to the limited amount of excavation and survey within this vast geographical region, the purpose of this paper is not to offer final solutions, but to suggest working hypotheses on the use of Chupadero Black-on-white and the people responsible for its distribution.

At Gran Quivira, Tabira, Pueblo Pardo, and in most of the localities where Chupadero Black-on-white is found, bowls, ladles, etc., are known to exist. However, the majority of reported sherds have indicated the presence of jar-shaped vessels. What were these jars used for? In reality, probably a number of things. Their size "... indicates that a diameter of 300 mm. was almost standard ... A jar this size could contain almost 15 quarts" (Hayes 1981: 70).

WATER TRANSPORTATION AND STORAGE

If the jar form was used for water transportation, the average weight of water would be 30 pounds, plus the weight of the jar. This weight would be acceptable for water procurement at short distances. This size (approximately 3-3/4 gallons) would be somewhat ideal for water storage.

The larger 15 quart jar (30+ pounds) would be totally unacceptable for long travel requirements. A man (or woman) can function on one to two quarts of water per day. One 15 quart jar of water would suffice a person from 7-1/2 to 15 days, a period too long to lug around between known water sources and an unacceptable weight. Contrast this size to what Alden Hayes had to say: "Spherical water bottles, with a capacity of little more than a quart, and equipped with loops near the neck for a suspension cord, are common in Pueblo III sites on the Little Colorado and San Juan Drainages, and they also occur in Chupadero Black-on-white" (Hayes 1981: 70).
If we are looking at small canteens being utilized (e.g., one quart size) and if they are only being utilized for water, then these sherds of Chupadero Black-on-white found in isolation or at large distances from a pueblo source should be highly curved and the vessel shape should be rather small. Further research in the distribution area should aim at giving volume estimates of Chupadero Black-on-white vessels based upon the projected curvature of the sherds where practicable. It is possible that most of the previous investigators in the region did not try to distinguish between jar and canteen sherds as they would both have exterior decorations and perhaps interior striations.

The interior striation of Chupadero Black-on-white has been a mystery to archaeologists for some time. If these jars were to be utilized for water storage, they would be extremely difficult to clean and the striations would tend to hold algae. The striations tend to flow with the coiling directions. Why this direction? It would be easier to scrape them up and down rather than sideways. Alden Hayes (personal communication) does not know why they are striated, but suggested that they might be some form of decoration. The only possible additional explanation this author can offer is that they might act as a ceramic rasp to prevent its contents from hardening into a large lump which would then be impossible to get out through the small orifice of the jar. It is interesting to note that the later large Tabira Black-on-white canteens are smooth on the inside and that no large Chupadero Black-on-white canteens are known to exist.

UTILIZATION FOR STORAGE

The large size of Chupadero Black-on-white vessels along with their small orifices would have been ideal for storage purposes. Beckett (1981) has suggested that the plano-convex stone disks found in the Tompiro pueblos were probably jar lids and not gaming pieces. If this hypothesis is correct, then the vast number of plano-convex disks present at Gran Quivira would suggest a great amount of storage by use of jars.

During the excavation of Mound 7 at Gran Quivira, Hayes (1981: 78) noted that two of the canteen varieties of Tabira Black-on-white, the ware that replaced Chupadero Black-on-white, were placed in the floor with the lip of the canteen flush with the floor, suggesting storage of water or foodstuffs.

USE FOR FOOD TRANSPORTATION OR PACKAGING UNITS

The wide distribution of Chupadero Black-on-white suggests its use as a trade item or transportation container. If we rule out water transportation for the almost standard 15-quart size vessel for reasons discussed earlier, then we must assume other usages.

One of the many areas where there has been a large number of Chupadero Black-on-white found at a distance from permanent pueblos is in the Mescalero Sands, a series of sand dunes just to the west of the Mescalero escarpment in eastern New Mexico. The shinnery acorn belt within this area appears to have been a major seasonal gathering area (e.g., Beckett 1975, 1976a, 1976b). The large amount of Chupadero Black-on-white there would tend to suggest its use in food processing at the site or use as a transporting container to bring back processed foods (e.g., acorn flour), or both.

These statements beg the questions: Do you transport empty or full jars to these areas or do you make them locally? If the jars were carried full into the area, what were their
contents? I earlier postulated (Beckett 1976a) that the Mescalero Sands were utilized as a seasonal gathering locale. Many of the sites also had large quantities of bone fragments and some local lithic debris from knapping in association with the ceramics and grinding stones. No evidence of structures was evident to the author, nor to Mera (1938) when he specifically looked for them there.

If these sites were indeed seasonally occupied sites, then several things were happening:

a) The women and children were probably collecting and processing the acorns and other available foodstuffs for later transportation, probably as flour as evidenced by the abundance of grinding stones and jar vessel sherds;

b) The men were utilizing the local outcrops of Ogallala chert for tool and point manufacture as evidenced by the lithic debris and tools in these sites;

c) The men were hunting either in the sands or on the caprock above the Mescalero Sands, as evidenced by the bone found in association with many of the ceramic sites. If they were hunting bison, the caprock makes an excellent place for driving them over the edge and butchering them at the bottom. We do know that they were utilizing bison, as a recent excavation by Wiseman and Beckett of a pithouse at the King Ranch Site south of Roswell had bison bones in association with brown wares and Chupadero Black-on-white (Wiseman 1981);

d) The preservation of bison meat would require "jerking," a process that is greatly improved by the addition of salt to the meat during drying. We know that the Jumano pueblos used salt and were probably involved in some of its distribution. We also know ethnographically that many Pueblo Indians hunted on the plains for buffalo. If you are going to use salt for jerking meat, it must be carried out onto the plains in some type of container. The first guess would be in some type of skin or basket container; however, if you are going to take pottery out into these areas, why not fill them with salt since the late summer and early fall would be the time of maximum rainfall in the region and they would provide dry storage. Not only brown wares and Chupadero Black-on-white are found in these sands, but Glaze Polychrome (cf. Mera 1938) from the pueblo area are present within this region, suggesting that ceramics were being transported long distances;

e) It is not suggested that Chupadero Black-on-white sherds were coming from the Jumano pueblos. It has been previously demonstrated that Chupadero Black-on-white was made in a number of pueblo areas within the region, Gran Quivira (Warren, in Hayes 1981), Sierra Blanca region (Kelley 1966), Middle Pecos Valley (Jelinek 1967), and others. It is suggested that most of the Chupadero Black-on-white and brown wares found away from the various pueblo areas (small and large) toward the Llano Estacado and in apparent isolation are exploitation sites from Jornada Mogollon inhabitants who were transporting vessels out into these areas.

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COMPARISON OF feature measurements
OF pit houses and surface houses of
the Gallina phase of the Anasazi culture
in north central new mexico and the
population estimates of a village

Herbert W. Dick and Hugh Davidson

INTRODUCTION

The excavations and site surveys of the Gallina phase of the Anasazi culture in north central New Mexico, on which this report is based, were conducted by Adams State College of Colorado over a period of nine years (1972-80).

This numerical comparison of house areas was possible because we standardized the scale for all maps and diagrams of cultural features early in these researches. All domiciles and outbuildings were scaled one-half inch to the foot and drawn on medium weight Dietzgen Microvel draft-vellum, which is translucent and transparent. These diagrams were then placed over cross-section paper on a light table, and the squares within the specific divisions were counted. From these counts areas could be determined, even for oval or round houses, to 1/25 of a square foot. We used Ridgway 636 10G cross-section paper, with 10 divisions to the inch.

In researching earlier work done in this area, we found that in most excavation reports scales were inadequate and few measurements were reported, or that the published scaled map was unreadable because of the small reproduction size. There was one example, an early and very important excavation report and doctoral dissertation, which contained no maps, diagrams, or measurements whatsoever. For these reasons we have used no other excavation reports in this tabulation.

During our research we concentrated on village groups, excavating every cultural feature in a naturally limited geographical area. This report represents the measurement of one community in its entirety, Huerfano Mesa (Figure 1), and some individual houses from other communities.

The communities covered in this report are all located 4 miles north of the Llaves, New Mexico, post office, which is located between the town of Regina and El Vado Dam. All are contained within Sections 2, 3, and 4, T25N, R1E, NMPM, Santa Fe National Forest. These communities, and the number of houses included from each, are as follows: Chupadera Camp, 1 surface house; Alkali Spring, 1 surface house; Hacha Ridge, 1 surface house and 1 pit house; Huerfano Mesa (all houses), 7 surface houses and 10 pit houses.

The completely excavated Huerfano Mesa village (Figure 1)(Dick 1976) is located in the §1W1/4, Sec. 2, T25N, R1E. The mesa itself is an erosional feature of alternating beds of shale and sandstone of Cretaceous geologic age. It is 53 acres in size, 7120 feet above sea level. The west side of the mesa is 75 feet above the flats, and there is a rock scarp 40 feet high on the north and south sides. The east side is a gentle slope of 10 percent. In the center of the mesa there is a shallow fault running northwest-southeast which because of erosion forms an elongated depression 600 feet long by 200 feet wide, ranging from 2 to 20 feet in depth; this depression divides the mesa into two equal parts. The depression contains a number of boulder-lined water breaks for horticulture plots. The mesa edge is covered with pinyon, juniper, oak, and an occasional Ponderosa pine, while the
Figure 1. Huerfano Mesa, 3 miles north of Llaves, New Mexico.
interior is covered with a thick cover of sagebrush.

The structures on Huerfano Mesa consisted of 10 pit houses, 4 of which were accompanied by outbuildings; 7 surface houses, one a double unit; and an isolated storage pit. Burials found on the mesa numbered 8 adults and 5 infants; the oldest adult was not over 45 years of age. There may have been more, but none was actively sought.

The various features in the house diagrams (Figures 2 and 3) can be identified by use of the following key:

- a. above-floor storage bins
- b. hearth
- d. flat rock
- e. shelf (banquette)
- f. ventilator
- g. air deflector
- h. vertical post
- m. below-floor storage
- q. horizontal wood supports
- r. adobe partition
- u. grinding station
- M. main room
- A. anteroom

The following letters refer to relative dates assigned to houses in Table 1, Pit Houses, Part A, and in Table 2, Surface Houses, Part A:
- E - Early (A.D. 1000-1100)
- I - Intermediate (A.D. 1100-1200)
- L - Late (A.D. 1200-1275)

FEATURE NOMENCLATURE

The five measured feature units compared in the tables are the integrated house features found in almost all Gallina Phase houses (Dick 1976: 22-27). These are:

1. Main room floor area (M): the floor area located in the northern two-thirds of the structure, excluding the shelf (banquette) and hearth area, and separated from the anteroom by the east-west bin complex.
2. Anteroom (A): the narrow alleyway between the east-west main storage bins (a) and the south wall, in which the ventilator (f) was placed.
3. Bin complex (a): the formal east-west bins which partitioned the main room from the anteroom.
4. Hearth area (b, g): the area that included the hearth, ash pit, deflector, and the space between the hearth and deflector. All components were associated with food preparation and heating and were located near the center of the house. The entrance ladder for both pit houses and surface houses was placed in the antechamber immediately behind the deflector.
5. Shelf (banquette) (e): the raised shelf placed against the walls of the main room on the north, east, and west sides. Storage bins were often placed in the shelf, more frequently in surface houses than in pit houses.

PIT HOUSES

(Table 1, Part A and B)

The total size range for 12 pit houses varied from 100.8 square feet to 264.5 square feet; the median was 158.0 square feet; the average was 159.7 square feet.

The tabulation of each of the main architectural features for pit houses as to range, median, and mean area in square feet, and percent of the total house, is listed below:

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<th>Feature</th>
<th>Range</th>
<th>Percent (%)</th>
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Figure 2. Pit house on Dam Ridge, 2 miles northeast of Llaves, New Mexico.
Figure 3. Surface house on Huerfano Mesa, 3 miles north of Llaves, New Mexico.
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<td>11.7</td>
<td>2.01</td>
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<tr>
<td>PH 63</td>
<td>246.0</td>
<td>5 : 1</td>
<td>f</td>
<td>4.4</td>
<td>39.6</td>
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<td>PH 64B</td>
<td>140.8</td>
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<tr>
<td>PH 76</td>
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<td>PH 78</td>
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<tr>
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<td>a</td>
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SURFACE HOUSES
(Table 2, Part A and B)

The total size range for 11 surface houses varied from 223.9 square feet to 381.5 square feet; the median was 314.9 square feet; the mean was 316.7 square feet.

The tabulation of each of the main architectural features for surface houses as to range, median, and mean area in square feet, and percent of the total house, is listed below:

<table>
<thead>
<tr>
<th>Main Room (Sq. ft.)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range 135.7-278.2</td>
<td>45.0-73.0</td>
</tr>
<tr>
<td>Median 170.0</td>
<td>52.5</td>
</tr>
<tr>
<td>Mean 177.7</td>
<td>53.4</td>
</tr>
<tr>
<td>Anteroom</td>
<td></td>
</tr>
<tr>
<td>Range 45.0-82.5</td>
<td>14.0-23.0</td>
</tr>
<tr>
<td>Median 54.8</td>
<td>17.0</td>
</tr>
<tr>
<td>Mean 59.2</td>
<td>17.9</td>
</tr>
<tr>
<td>East-West Bins</td>
<td></td>
</tr>
<tr>
<td>Range 26.6-43.6</td>
<td>8.0-12.0</td>
</tr>
<tr>
<td>Median 33.2</td>
<td>10.5</td>
</tr>
<tr>
<td>Mean 33.9</td>
<td>10.3</td>
</tr>
<tr>
<td>Hearth Area</td>
<td></td>
</tr>
<tr>
<td>Range 2.6-16.1</td>
<td>1.0-4.0</td>
</tr>
<tr>
<td>Median 9.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Mean 9.6</td>
<td>2.6</td>
</tr>
<tr>
<td>Shelf</td>
<td></td>
</tr>
<tr>
<td>Range 27.9-73.2</td>
<td>8.0-21.0</td>
</tr>
<tr>
<td>Median 50.4</td>
<td>16.0</td>
</tr>
<tr>
<td>Mean 51.4</td>
<td>15.9</td>
</tr>
</tbody>
</table>

PIT HOUSE-SURFACE HOUSE COMPARISON

Below is a comparison of the features both by numerical mean area and by mean percent of total area:

<table>
<thead>
<tr>
<th>Pit House Mean Sq. Ft.</th>
<th>Percent</th>
<th>Surface House Mean Sq. Ft.</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Area</td>
<td>276.8</td>
<td>100.0</td>
<td>320.0</td>
</tr>
<tr>
<td>Main Room</td>
<td>159.7</td>
<td>58.0</td>
<td>177.7</td>
</tr>
<tr>
<td>Anteroom</td>
<td>46.1</td>
<td>16.6</td>
<td>59.2</td>
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<tr>
<td>E-W Bins</td>
<td>20.3</td>
<td>7.5</td>
<td>33.9</td>
</tr>
<tr>
<td>Hearth Area</td>
<td>9.5</td>
<td>3.3</td>
<td>9.6</td>
</tr>
<tr>
<td>Shelf</td>
<td>45.0</td>
<td>14.6</td>
<td>51.4</td>
</tr>
</tbody>
</table>

There was greater variation in pit house size than in surface house size. The difference in size between the smallest and the largest pit house was 292.4 square feet, whereas the difference between the smallest and the largest surface house was only 157.9 square feet. The difference was even more evident in the site surveys, where pit houses have been recorded as large as 60 feet in diameter.

POPULATION ESTIMATES

To obtain population estimates for each dwelling on Huerfano Mesa (Table 1, Part B; Table 2, Part B), we used Naroll's Constant formula (Naroll 1962: 187). Although the formula was originally employed to determine the number of occupants in each house unit of the Mandan Indians in the Thomas Riggs site in South Dakota (Thomas 1976: 9), we believed that since the dispersed nature of the Gallina houses was similar to the individual lodges of the Mandan, the formula could hypothetically apply.

Since all of the houses in the Huerfano Mesa village (Figure 1) were excavated, we thought that this numerical experiment could best be applied to determine the total population of a specific period; thus we used only those houses assigned to the late period dating between A.D. 1200 and A.D. 1275 (ca. four generations), which included 4 pit houses and 7 surface houses.
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SH 1</td>
<td>L</td>
<td>170.1</td>
<td>58.1</td>
<td>37.1</td>
<td>11.6</td>
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<tr>
<td></td>
<td></td>
<td>47%</td>
<td>16%</td>
<td>10%</td>
<td>3%</td>
<td>19%</td>
<td>100%</td>
</tr>
<tr>
<td>SH 4</td>
<td>L</td>
<td>136.8</td>
<td>45.9</td>
<td>26.6</td>
<td>7.6</td>
<td>48.9</td>
<td>268.5</td>
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<tr>
<td></td>
<td></td>
<td>51%</td>
<td>17%</td>
<td>10%</td>
<td>3%</td>
<td>18%</td>
<td>100%</td>
</tr>
<tr>
<td>SH 7</td>
<td>L</td>
<td>176.4</td>
<td>82.5</td>
<td>28.6</td>
<td>9.1</td>
<td>50.4</td>
<td>359.1</td>
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<td></td>
<td>49%</td>
<td>23%</td>
<td>8%</td>
<td>3%</td>
<td>14%</td>
<td>100%</td>
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<tr>
<td>SH 8</td>
<td>L</td>
<td>200.1</td>
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<td>42.9</td>
<td>16.1</td>
<td>27.9</td>
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<td></td>
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<td>20%</td>
<td>12%</td>
<td>4%</td>
<td>8%</td>
<td>100%</td>
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<td>11%</td>
<td>3%</td>
<td>20%</td>
<td>100%</td>
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<tr>
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<td>L</td>
<td>158.6</td>
<td>74.8</td>
<td>43.6</td>
<td>2.6</td>
<td>73.2</td>
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<td>45%</td>
<td>21%</td>
<td>12%</td>
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<td>21%</td>
<td>100%</td>
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<td>17%</td>
<td>11%</td>
<td>3%</td>
<td>14%</td>
<td>100%</td>
</tr>
<tr>
<td>SH 77A</td>
<td>L</td>
<td>170.0</td>
<td>62.2</td>
<td>34.8</td>
<td>8.1</td>
<td>42.3</td>
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<td>20%</td>
<td>11%</td>
<td>2%</td>
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<td>L</td>
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<td>14%</td>
<td>9%</td>
<td>3%</td>
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<td>100%</td>
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<tr>
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<td>45.0</td>
<td>28.4</td>
<td>9.8</td>
<td>52.4</td>
<td>329.1</td>
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<td>14%</td>
<td>9%</td>
<td>3%</td>
<td>16%</td>
<td>100%</td>
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<td>Main Room/Anteroom Ratio</td>
<td>Auxiliary Features (Sq. Ft.)</td>
<td>Storage Area (Cu. Ft.)</td>
<td>Occupants</td>
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<tr>
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<td>3 : 1</td>
<td>m 3.8</td>
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<td>-</td>
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<td>f 2.0</td>
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<td>2.69</td>
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<tr>
<td>SH 77A</td>
<td>232.3</td>
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<td>f 7.5</td>
<td>39.7</td>
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<tr>
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<td>5 : 1</td>
<td>f 8.3</td>
<td>45.5</td>
<td>3.54</td>
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<td>86%</td>
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</tr>
<tr>
<td>SH 80</td>
<td>235.6</td>
<td>4 : 1</td>
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<td>71%</td>
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</tr>
</tbody>
</table>

Table 2. Pit Houses - Part B.
Pit House

| 1A  | 234.7 sq. ft. 
| 3   | 264.1  
| 76  | 247.0  
| 79  | 222.5  
| **Total** | **968.3 sq. ft.**

Surface House

| 1   | 361.1 sq. ft. 
| 4   | 288.5  
| 7   | 359.1  
| 8   | 365.2  
| 30  | 287.5  
| 77A | 300.8  
| 77B | 381.5  
| **Total** | **2323.7 sq. ft.**

The total square feet of 4 late pit houses and 7 late surface houses on Huerfano Mesa was 3292 square feet. The population was derived in the following manner:

\[
\begin{align*}
3292.0 & \times 0.929 \\
395.9 & \text{ square meters} \\
39.59 & \text{ population (Naroll's Constant)}
\end{align*}
\]

Thus, between A.D. 1200 and A.D. 1275, 39 to 40 persons occupied the Huerfano Mesa village at any given time.

Using other methods, Eddy (1966: 491) estimated that 3.5 persons occupied an individual house in the Navajo Reservoir area. Also, the rule-of-thumb number 4 is sometimes used in estimating population, representing a nuclear family consisting of mother, father, and 2 children. These two methods would give us 38.5 (Eddy) and 44 respectively.

The relatively small population estimate arrived at with all three of these methods is not out of the realm of reality when we take into account the high infant mortality and low longevity rate beyond the reproductive years as was indicated by the skeletal remains.

On Huerfano Mesa, of the total of 16 houses ever built, probably only 11 or 69 percent were occupied at any given time.

In the population occupying some 40,000 acres surveyed around the present community of Llaves, the major occupation existed between A.D. 1200 and 1275, a relatively short time of 75 years. By A.D. 1280, at the very latest, the Gallina people ceased to occupy a vast mountainous area. This culture demise occurred in situ; that is, there was little or no emigration of large numbers of people. Although not actively sought, there were sites recorded and several excavated that could have been middle 15th century Navajo; but there was no indisputable evidence for this conjecture. At present writing there seems to be a cultural hiatus in the region from the late 13th to the early 20th centuries, perhaps as long as 600 years.

Climatic factors could have played a prominent role in both the early population increases and later population decreases. One such factor that is difficult to measure, unlike drought, is temperature. In 4 out of 9 years (1972-1980), a short series of very low (freezing) temperatures destroyed corn and beans in Llaves gardens in late June and in one instance, in early July. During the same 9 year period, there were only one good moisture year and several fair moisture years. Had similar conditions occurred during a like period in the 13th century, the population would have had great difficulty in providing themselves with their basic subsistence foods, corn, beans, and squash. This would have led to gradual starvation with consequent health and social problems, and to an ever increasing infant mortality and increased morbidity in the general population. Further, gathering by a large population would have had its limits.

Our comparative measurements of pit houses and surface houses in the Llaves area have revealed the following structural relationships:
1. Pit houses predominated earlier and surface houses later; but pit houses coexisted with surface structures until the area was abandoned.

2. The mean sizes of the surface houses are larger than the mean sizes of pit houses.

3. The east-west partition storage bins of surface houses were generally larger than those found in pit houses. These bins were rarely used for food storage. In all houses excavated only artifacts were found in partition bins.

4. The antechambers of surface houses were proportionally larger than those of pit houses; perhaps this was due to the naturally delimiting floor surface of a circular structure, unlike that of a rectangular structure.

5. The total shelf surface area of surface houses was larger than that of pit houses.

6. The percentage of house area devoted to the hearth area was the same for both house styles, regardless of house size.

7. Each feature, except the hearth area, was proportional as a percentage mean to the house size in square feet for both the pit house and surface house.

8. The reason for the structural dichotomy of pit house and surface house as a sustained dual cultural motif is not readily explainable.

Taos, N.M.

BIBLIOGRAPHY

Dick, Herbert W.

Eddy, Frank W.

Naroll, Raoul

Thomas, David Hurst
INTRODUCTION

Prehistoric man throughout a large part of the Southwest met the need for domestic water by constructing reservoirs, or making use of natural cisterns. Through a trial and error method, he learned good, sound, and practical methods of engineering design and construction. From present day calculations of minimum usage of water, and a limited study of jars apparently used for carrying water in prehistoric times, an estimate of per capita daily water consumption has been made. By determining reservoir capacity, and water usage, the possible population served by a particular reservoir has been estimated.

Although man may have an abundance of food, proper shelter, tools to work with, and body covering for both summer and winter, there is still one ingredient that is necessary for man to survive. That one ingredient is water.

There is no question prehistoric man in the Southwest obtained water from natural streams and lakes. It now appears he also constructed reservoirs for the storage of water for future use. In addition, there were natural reservoirs which prehistoric man discovered and used. Walk-in wells were also developed.

The construction of a reservoir may appear a simple matter. However, to make a reservoir function and not destroy itself is a matter of having seen a reservoir and combining this concept with trial and error methods of construction for each particular area. Prehistoric man, without modern day technical training, succeeded in performing sophisticated engineering works.

This preliminary paper discusses a number of water storage reservoirs in the Southwest that existed in prehistoric times, along with possible use of the stored water. Irrigation reservoirs and devices are another subject and are not included in this discussion.

Webster's New Collegiate Dictionary defines a reservoir as "A place where water is collected and kept for use when wanted." Of course reservoirs can also be used for other purposes such as today's practice of storing petroleum in reservoirs. The word "tank" is used synonymously with reservoir. Engineers, however, tend to think of a tank as a closed vessel such as a hot water tank. In municipal water systems in today's world, a reservoir is always thought of as a water storage reservoir. Accordingly, the simple word reservoir in this paper will follow Webster's definition of "A place where water is collected and kept for use when wanted."

USE OF ENGLISH SYSTEM OF MEASUREMENT

In the United States, people are familiar with a gallon of water, a gallon of milk, a gallon of gasoline. New Mexico State Statutes Annotated (72-5-19) state that the flow of water shall be the cubic feet per second, and the measurement of water shall be the acre foot, or an acre of water one foot deep which is equivalent to 325,851 gallons. Accordingly, this paper is written using the English form of standard measurements as used in the United States.
NEED FOR A RESERVOIR

In the "Southwest," which is arid in comparison with other parts of the United States, most streams are intermittent. Not only does lack of precipitation affect a stream flow, but geology, weather patterns, elevation, and ground cover also play important parts. For whatever purpose, many prehistoric sites are located on mesas or plateaus, where there has been no natural stream. This would have necessitated carrying water from perennial streams often located a thousand or more feet lower down and, in some cases, three or four miles distant.

In certain areas, snow would provide water during the winter months. Summer months would require the carrying of water from other sources. Ponds or lakes from snow melt, or spring rains, could provide water for two or three months, which would reduce the lack of water to three or four summer months. Prehistoric man then conceived the idea of storing water from periods of high precipitation for the following dry periods.

Apparently in a few areas walk-in wells were constructed. Patrick H. Beckett has noted that there is a possibility of a walk-in well to the northwest of the main site at Gran Quiverra National Monument. The water table must be close to the surface, probably not over 20 feet, for construction of such a well.

PRINCIPLES OF RESERVOIR CONSTRUCTION AND MAINTENANCE

There are several basic principles involved in the construction of a reservoir, all of them equally important.

1. Drainage Area: An area where precipitation will fall and gravity flow to the reservoir. The drainage area must be small in size, not over 100 acres, to limit the amount of run-off. Too great a flow of water will result in the dam being breached. A desirable area would be one located where precipitation will occur; it would also be covered with vegetation which would retard the flow and prevent scouring and the formation of gullies.

2. Embankment: Soil must be suitable for the dam or embankment. A soil which is graded from coarse sand particles to clay particles and contains not less than 20 percent of the latter will usually be suitable. Soil which is made up of sand particles will ordinarily be unsuitable. Material such as pure clay will not be suitable as exposed surfaces tend to shrink and crack when dry. Silt many times will seal the bottom of a reservoir and prevent percolation. Soil can be simply tested by the "jar test" of placing a handful of soil in a glass jar, filling with water, shaking and letting settle for 24 hours. Sands will go to the bottom, and clay will be in the top layers (USNRC 1939: 137).

The volume of earth, or rock and earth fill in the embankment is all-important. Early people had no iron tools to work with and probably excavated with wooden and stone implements. Excavated material or spoil could have been carried from the pond area to the embankment in baskets. Damp or wet earth can be worked with ease. Accordingly, most excavation would possibly have been done following snow melt or extended periods of precipitation when the earth would have been saturated.

3. Use Location: The reservoir must be within a reasonable walking distance of the users.

4. Spillway: A spillway must be provided to take care of excess flows and prevent topping of the embankment with resultant failure of the dam. Inadequate or improperly constructed spillways have been the bane of many cattle tanks in the Southwest. Capacity of a spillway for small drainage areas may be determined from the rational formula \( Q = CiA \) in which \( Q = \)
the peak discharge in cubic feet per second, \( i \) = intensity of rainfall in inches per hour, \( A \) = the drainage area in acres, and \( c \) = coefficient of run-off (USNRC 1939: 36). Metric units are not applicable in this formula. Capacity of desired spillways for prehistoric structures may be determined from proper use of this equation.

Spillways for off-channel storage should be equal to the area of the inlet channel or greater.

Scouring of the bottom and ends of a spillway will occur if the quantity of water passing through the spillway is too great. This can be prevented by making the spillway longer, placing the spillway on rock, or lining with rock.

5. Embankment Protection: Protection must be provided on an earthen dam against wave action. Lining with rock or cobblestone is one method. Gentle slopes are quite often used; however, this increases the volume of fill in the embankment. Upstream slope ratios of \( 2\frac{1}{2} \) (horizontal) to 1 (vertical) are the minimum necessary for protection against wave action. The waves themselves will wash earth to form a slope which is stable.

6. Fissures in Rock: If the reservoir is constructed on rock, there is a possibility that fissures or cracks exist that would allow water to escape. If fissures do exist, it is possible to seal with clay or silt, sometimes naturally.

7. Compaction: To prevent leakage through an earthen embankment, the earth must be compacted. If the earth was carried in baskets, and dumped, then compaction would be accomplished by the person walking back and forth over the recently deposited fill. It is possible the builders learned to compact the earth by walking sideways and stamping each step. Earth is also compacted when saturated with water, and the use of mud for fill would have ensured a tight dam, providing the mud was not predominately clay. Better compaction takes place when the earth is damp, and moist excavated earth would have been ideal for use in the embankment.

8. Reservoir Losses: Reservoirs lose water by evaporation, caused by wind and temperature (sunshine), and by percolation or seepage. Evaporation can be decreased by locating the reservoir in a shaded area. Seepage can be decreased by lining the bottom with clay or runoff water carrying a heavy load of silt.

9. Maintenance: Periodic maintenance would consist of repairing any scoured or gullied spots which occur on slopes, possible rebuilding of the spillway, clearing the edges of brush, and solving the major problem of silt. The silt would probably be excavated while moist and used to repair or raise the embankment. Some silt could have been left in the bottom to seal the reservoir, particularly if the bottom is on porous soil or rock.

RECOGNITION OF PREHISTORIC VERSUS HISTORIC RESERVOIRS

Earthen cattle watering tanks were being constructed as early as 1912 (USDA 1912: photo) to catch and hold storm run-off. A reservoir some 80 years old when seen today could easily be mistaken for a prehistoric reservoir, particularly if the reservoir is full of silt, a heavy or different type of vegetation, and with a breach in the embankment. It is quite possible that historic reservoirs could have been constructed on prehistoric sites making the identification even more difficult. A prehistoric reservoir would first have to be associated with a prehistoric site. Other items to be considered would be a limited drainage area, a difference in the vegetation at the reservoir, a soil that could be worked with primitive tools, absence of any marks left by modern day construction equipment, and similar features. The presence of any sort of a valve or device in the bottom of a
reservoir to draw off water would immediately place the reservoir in a historic phase. Early man had no method of placing a conduit through the embankment or a water tight valve under water some five feet in depth. Capstones over plaza drains are common in the Southwest on prehistoric sites (DiPeso 1974: 353). These capstones apparently were for protection of the drain during dry weather and did not serve as a gate or valve to prevent the entrance of water.

Early people could not prevent the breakage of some jars or bowls used to carry water. All prehistoric reservoirs inspected in the preparation of this paper contained sherds. That is not to say that the embankments containing sherds are necessarily prehistoric, but sherds would be a very good indicator.

Heavy or different types of vegetation on an aerial photograph, particularly if "U" shaped, could indicate a reservoir. A field inspection must be made for closer study of the features and the degree of compliance with criteria set forth earlier.

Most earthen reservoirs will contain silt deposits. Stratigraphy will indicate storms, the bottom of the reservoir, possible weather patterns, and type(s) of soil. It can also furnish earth samples. Earth samples might be used for pollen studies and flotation analysis. Sampling could be done with a soil auger, test pit, or a cut bank resulting from erosion.

TYPES OF RESEROIRS

Reservoirs consist of two types. One is an embankment constructed across the bottom of a drainage area, and the second is off-stream. A subtype is an excavation constructed adjacent to or within a pueblo to catch and store run-off from roofs of the pueblo. In the off-stream, a small dam is constructed on a drainage low spot, or at the outlet of a spring, and the water carried to a natural depression or constructed reservoir by ditch.

WATER QUALITY PROBLEMS WITH RESERVOIRS

Cattails (Typha latifolia) will move into a reservoir, and reduce storage volume. Another problem that must have plagued early people is algae. Algae is easily recognized as a green, or blue-green slime, scum, or stringy plant growth that will occur in all open reservoirs that receive sunlight, chemicals (all natural waters have some chemicals), and an increase in temperature of the water. A slight increase in temperature along with sunshine provides the environment for algae to grow. Algae generally does not grow in water deeper than 5 to 10 feet. Algae growth commences in the spring and early summer when the temperature of the water increases, and days are longer. Water with algae has to be first strained before drinking or use for cooking. When the algae dies, mats float to the surface and create disagreeable odors. Many live algae create an offensive taste and odor. In modern reservoirs, growth of algae is controlled by treating the pond or lake with copper sulfate (Harvey 1978: 1). Ancient man probably had to rely on straining. Loosely woven baskets would do an effective job. It is very doubtful if early man learned to strain polluted water through a sand filtering agent.

In most muddy waters, the sediment will settle within a few days. Collodial silts will not settle, however, and water will remain muddy indefinitely. This water is not harmful to drink; if it is the only water available, the color could be tolerated.

WATER CONSUMPTION

In present day America, water consumption is measured in gallons per capita per day. The consumption of
water (GCD) will vary with temperature, precipitation, individuals, sanitation, customs of the area, humidity, cost of the water, availability, elevation, home landscaping, and other factors. Water used in prehistoric times in the Southwest would be dependent upon the minimum amount required for drinking, culinary use, perhaps washing, pottery making, and plastering of buildings. If the water was not readily available, then usage would be limited to the bare necessities of drinking, culinary use, limited washing, and pottery making. If the water must be carried any distance by the user, this would also affect consumption. It would be during the dry periods that water from reservoirs would be carefully used and conserved.

It is not possible to determine how much water was used some 800 years ago per individual per day. Some idea of amounts can be adduced from present-day usage, and the capacity of prehistoric vessels. From Engineer Field Manual FM 5-10 1940, a man in combat requires 1/3 to 1/2 gallons per day; normal usage, 1 gallon per day; in bivouac minimum, and not exceeding three days cooking and drinking only, 1 gallon per day. For a temporary camp including drinking, cooking, and washing, 5 gallons per day. In contrast is a permanent camp at 50 gallons per day. This 50 GPD includes water for baths, and toilets. Not included is landscaping or construction.

Minimum water for survival in a liferaft is one pint per day (US DHEW 1978: 341).

The Hopi Villages were visited in April of 1983, and conversations were held with two knowledgeable Hopi men on domestic water usage. Many sections of the Hopi pueblos still carry water from springs, and from recently installed central water tanks. The Hopi family of today averages six persons, and 9 to 10 gallons of water per family per day are used. Laundry is done at local laundromats. Accordingly, about 1 1/2 GCD of water is being used for cooking, pottery making, and washing.

Prehistoric jars or ollas that were presumably used for carrying water were measured at the Laboratory of Anthropology, Santa Fe (details are given in Table 1). As this is a preliminary study, only seven jars from the study area were measured. Future studies would be in order for a more detailed selection of jars, including a greater number. Jars from the Gallina culture averaged 11 quarts, and from the Pajarito Plateau, 14.7 quarts. Assuming that a family would use two young girls to carry water in each family, and that a family consisted of five persons, then consumption would be 1.2 GCD for Gallina, and 1.5 GCD for the Pajarito. If the assumption is made that a family consisted of three persons, and only one person carried water, the end results in consumption per person per day would be the same. It is probable that consumption varied from one gallon to two gallons per person per day.

Modern day limited domestic consumption compares quite favorably with prehistoric data, although further study is in order. For the purpose of this paper, and to be on the conservative side, the amount of 1 3/4 gallons per capita per day (GCD) will be used.

**PRECIPITATION**

Precipitation in the form of snow, hail, or rainfall must be present to provide water for a reservoir. In the Southwest, the mountains above 8,000 feet altitude generally receive snow, and in some areas up to 6 feet is common. High elevations are also characterized by sudden violent summer storms with lightning, and a very high intensity of rainfall. Such rainfall may only occur for a duration of 15 minutes. From a study of numerous run-off records, precipitation has no regular pattern. Engineers commonly
Table 1. Capacity of Prehistoric Water Jars.

<table>
<thead>
<tr>
<th>No.</th>
<th>Type</th>
<th>Age AD</th>
<th>LA No.</th>
<th>Approximate Dimensions</th>
<th>Capacity in Gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Gallina Black-on-white jar</td>
<td>1200</td>
<td>46932/11</td>
<td>15 in. W X 13 in. H</td>
<td>5 *</td>
</tr>
<tr>
<td>2.</td>
<td>Gallina Black-on-white jar</td>
<td>1200</td>
<td>46883/11</td>
<td>11 in. W X 10 in. H</td>
<td>2.75</td>
</tr>
<tr>
<td>3.</td>
<td>Gallina Black-on-white jar</td>
<td>1200</td>
<td>46926/11</td>
<td>12 in. W X 11 in. H</td>
<td>2.75</td>
</tr>
<tr>
<td>4.</td>
<td>Biscuitware</td>
<td>1300-1400</td>
<td>21922/11</td>
<td>10½ in. W X 13 in. H</td>
<td>3.75</td>
</tr>
<tr>
<td>7.</td>
<td>Casas Grande Ramos Polychrome</td>
<td>1060-1340</td>
<td>37779/11</td>
<td>10 in. W X 8 in. H</td>
<td>1.5**</td>
</tr>
<tr>
<td></td>
<td>Standard Variety</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Water would weigh 42 pounds, and as this weight would be difficult to carry, data not used.

** Casas Grandes environment is not compatible with other sites in study, data not used.

Jars or ollas were filled with styrofoam nodules to level that water would be carried without loss from splashing. Width is the maximum body measurement. All jars are from Laboratory of Anthropology, Santa Fe. Jars were selected by Regge Wiseman that presumably were used for carrying water.
design for 5, 10, 15, 20 year, etc. rains. It is also common for engineers to design for 100, 200, and even 500 year maximums.

It must be understood that the period is not a definite cycle, but rather that a storm of a certain magnitude will probably occur once within the selected period. It is quite possible, however, that a projected 100-year storm may repeat within a few days.

From Climatological Data, Annual Summary 1980 of the National Climatic Center, stations in New Mexico with the longest years of record are Albuquerque with 109 years, Fort Bayard with 102 years, and New Mexico State University with 117 years. Therefore, anything over 100 years is little more than educated guessing. Unfortunately, only a few stations have records of intensity of precipitation (i) measured in inches per hour. Also, only a few stations have a record of evaporation. To further complicate studies of prehistoric reservoirs, no precipitation recording weather stations are located in a study area. A difference in elevation of a thousand feet from a weather station may result in a quite different weather pattern. This is easily recognizable from the changes in vegetation.

From a cursory examination of National Park Service PB-266 340 for the period 1100 AD to 1200 AD and compared to 1960 AD it would appear the Cuba-Pajarito Plateau weather of the earlier period did not differ substantially from that of today.

Accordingly, weather patterns as presently used for the design of reservoirs are used in this preliminary paper. A frequency of 10 years is used, based upon the assumption that to construct a reservoir stronger than a 10-year storm would not be worth the effort. In the location of prehistoric reservoirs in New Mexico, a one-hour rain with an intensity of 1.5 inches per hour could be expected every 10 years (Seelye 1960: 18-21). From a cursory review of weather data published by NOAA using the Cuba, Abiquiú Dam, and Cochetit Reservoir Weather Stations, sudden storms occur from May through August. Of the four months, June and July have the least precipitation. Thunderstorms appear to occur at least once a month during this period.

Snow for the same area will range from 20 to 60 inches. Snow melt does not create the same problem at a reservoir as sudden summer storms. The depth of snow will be evident for a period that will allow local persons attending a reservoir to be prepared for a high run-off.

EXISTING PREHISTORIC RESERVOIR SITES

Preliminary field surveys have been made for Puye (LA 47); Capulin Creek, northeast of Llaves; Rattlesnake Ridge (Bg-20-2); Hueco Tanks, Texas; and Casas Grandes, Chihuahua, Republic of Mexico. There is no evidence that any of these reservoirs were used for anything except domestic use. Wheat (1952) also came to a similar conclusion in his studies of reservoirs.

Reservoirs, apparently domestic in use, have also been reported for Tsankawi, Tshirege, Tsiping, Homayo, and Otowi on the Pajarito Plateau near Los Alamos (Dougherty 1980: 20). Stewart L. Peekham has stated other reservoirs apparently exist at Shufine, Old Kotyiti, and San Lazaro. A natural basin in Chaco Canyon apparently served as a reservoir for domestic use. Three sets of steps were cut into the bedrock leading to the bottom (Windes 1978: 105).

Walk-in wells exist at Point of Pines (Wheat 1952: 185-196), Site 616, Mariana Mesa (McGimsey 1980: 101-103), and at Gran Quivira (Howard 1959: 85-91). A walk-in well would have to be for domestic use, as there
would be no reasonable way to utilize water for irrigation. A well is a more advanced form of engineering than a reservoir, but is much more dependable. As no walk-in wells have been field investigated, no data are available for this paper.

Table 2 sets forth information from preliminary field surveys of existing prehistoric domestic reservoirs.

**Puye:** A sketch of this reservoir is shown in Figure 1. The reservoir is located immediately uphill and to the west of the room blocks. The reservoir apparently was constructed by excavating a depression and forming an embankment with the spoil. A most interesting feature is the lining of the inside of the reservoir with 2 to 3-foot long vertical rock. This rock lining could have been placed to reduce wave action on the embankment, provide more storage volume, and would also prevent algae growth. Numerous sherds were noted on the inside, top, and outside slope of the embankment. The soil is quite porous, and has sealed itself with silt. A low constructed dike channels water into the reservoir on the northern or uphill side. The spillway is formed by the natural exposed rock and provides a uniform low velocity overflow. No scouring was seen in the spillway. The reservoir is in quite good condition and is still functioning even though a thick layer of silt exists in the basin. On the basis of 30 days with no supplemental precipitation, the reservoir would have provided water for some 1,300 persons at the rate of 1.75 GCD. Farm land is immediately adjacent to the reservoir, and it is conceivable that water was carried to individual crop plants in jars. The embankment is littered with sherds and rocks and should be investigated by an archaeologist. A detailed map and soil borings are highly recommended for this site, particularly in view of the large capacity of the reservoir.

**Llaves:** A sketch of the reservoir is shown in Figure 2. Numerous prehistoric sites exist within one-half mile to the north and to the west. The reservoir is located on Capulin Creek which at this time is a deeply scoured arroyo. There is a good possibility that the valley was well covered with grass and brush vegetation at the time of reservoir construction. This reservoir appeared to have been constructed by excavating a depression and using the spoil for the embankment. The soil is Nacimiento clay and shales. The drainage area is to the east and provides a brush-covered, gentle slope to the reservoir. The spillway is natural earth, and today, a gully some 10 feet deep exists. The very large flow of approximately 21 cubic feet per second could not be handled by the spillway and accordingly the dam has been breached. Well defined layers of silt may be seen in the spillway breach, and warrant additional studies. On the basis of 60 days with no supplemental precipitation, the reservoir would have provided water for some 3,400 persons at the rate of 1.75 GCD. Farm land is immediately adjacent to the reservoir, and it is conceivable that water was carried to individual crop plants in jars. The embankment is littered with sherds and rocks and should be investigated by an archaeologist. A detailed map and soil borings are highly recommended for this site, particularly in view of the large capacity of the reservoir.

**Rattlesnake:** This small reservoir is located on Rattlesnake Ridge immediately adjacent to dwelling structures. The site was visited with R. Wiseman, and it would appear the reservoir was first an excavation pit for building material and later improved to serve as a reservoir. A small diversion dike channels water into the reservoir. Roof drainage from adjacent structures could have also been diverted. The site was surveyed in 1978 by Richard Bice, and trenches were excavated to bedrock (Bice 1980: 153-155). On the basis of 45 days with no supplemental precipitation, the reservoir could have provided water for some 150 persons at the rate of 1.75 GCD. A more detailed ground survey and soil boring are suggested for this site.
Table 2. Reservoirs with Preliminary Field Surveys.

<table>
<thead>
<tr>
<th>Section</th>
<th>Puye</th>
<th>Llaves</th>
<th>Rattlesnake</th>
<th>Hueco Tanks</th>
<th>Casas Grandes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lat. 31°53'N</td>
<td>Lat. 30°22'N</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range and Township NMPM</td>
<td>R7E T20N</td>
<td>R1E T25N</td>
<td>R1E T26N</td>
<td>Long.106°25'W</td>
<td>Long.107°55'W</td>
</tr>
<tr>
<td>UTM East and North</td>
<td>--</td>
<td>337 4030</td>
<td>336 4038</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Type</td>
<td>across drainage</td>
<td>across drainage</td>
<td>across drainage</td>
<td>cistern</td>
<td>off-stream</td>
</tr>
<tr>
<td>Soil</td>
<td>Puye conglomerate</td>
<td>Nacimiento shale-clay</td>
<td>Nacimiento shale-clay</td>
<td>Dolomite</td>
<td>Sandy clay caliche</td>
</tr>
<tr>
<td>Drainage area in acres</td>
<td>5</td>
<td>20</td>
<td>2</td>
<td>3</td>
<td>spring</td>
</tr>
<tr>
<td>Vegetation of drainage area</td>
<td>piñon</td>
<td>piñon</td>
<td>piñon</td>
<td>none</td>
<td>mesquite</td>
</tr>
<tr>
<td>Terrain</td>
<td>slope</td>
<td>rolling</td>
<td>rolling</td>
<td>rock</td>
<td>rolling</td>
</tr>
<tr>
<td>Amount of run-off (in percent)</td>
<td>80</td>
<td>85</td>
<td>90</td>
<td>98</td>
<td>--</td>
</tr>
<tr>
<td>Embankment</td>
<td>earth w/rock</td>
<td>earth</td>
<td>earth</td>
<td>rock</td>
<td>earth</td>
</tr>
<tr>
<td>Rip-rap</td>
<td>inside</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>inside</td>
</tr>
<tr>
<td>Spillway design</td>
<td>flat rock</td>
<td>flat grass</td>
<td>flat earth</td>
<td>rock</td>
<td>rock-lined</td>
</tr>
<tr>
<td>Spillway capacity in cubic feet/second</td>
<td>6</td>
<td>21.7</td>
<td>2.5</td>
<td>1.5</td>
<td>5</td>
</tr>
<tr>
<td>Spillway, width and depth, ft.</td>
<td>10 x 0.3</td>
<td>18 x 0.3</td>
<td>4.5 x 0.3</td>
<td>5.0 x 0.3</td>
<td>1.5 x 1.0</td>
</tr>
<tr>
<td>Reservoir losses in percent per month</td>
<td>12</td>
<td>10</td>
<td>9</td>
<td>5</td>
<td>20</td>
</tr>
</tbody>
</table>
Table 2. Reservoirs with Preliminary Field Surveys (Continued).

<table>
<thead>
<tr>
<th></th>
<th>Puye</th>
<th>Llaves</th>
<th>Rattlesnake</th>
<th>Hueco Tanks</th>
<th>Casas Grandes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silt depth, estimated in feet</td>
<td>2</td>
<td>7</td>
<td>3</td>
<td>none</td>
<td>excavated</td>
</tr>
<tr>
<td>Estimated surface area in acres</td>
<td>0.12</td>
<td>0.41</td>
<td>0.1</td>
<td>0.01</td>
<td>0.04</td>
</tr>
<tr>
<td>Estimated depth in feet</td>
<td>5</td>
<td>8</td>
<td>3</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Capacity in acre feet</td>
<td>0.48</td>
<td>2.43</td>
<td>0.18</td>
<td>0.08</td>
<td>0.20</td>
</tr>
<tr>
<td>Capacity in gallons</td>
<td>78,000</td>
<td>396,500</td>
<td>29,300</td>
<td>13,000</td>
<td>33,000</td>
</tr>
<tr>
<td>Capacity after losses</td>
<td>68,600</td>
<td>356,800</td>
<td>26,663</td>
<td>12,350</td>
<td>26,400</td>
</tr>
<tr>
<td>Elevation in feet</td>
<td>7,060</td>
<td>6,950</td>
<td>7,650</td>
<td>5,000</td>
<td>5,100</td>
</tr>
<tr>
<td>Average annual precipitation, inches</td>
<td>12</td>
<td>16</td>
<td>16</td>
<td>10</td>
<td>10 (est.)</td>
</tr>
</tbody>
</table>
To Recon Blocks, Approximately 200'

Runoff Estimated At 80%

Pinon

Water Flow

Excavated

123', Diversion Dike

Rock Spillway

1" = 30'
March 1983

Reference-USGS Quad.
PUYE 1:24,000

Elevation 7060 MSL

Embarkment

13' - 4 M.
2' to 3' Long Rock
On Inside Slope

Berm 8.7'
5.7'

2.6 M.
1.7 M.

SECTIO N A-A

Drawn
Wiseman
Turney

FIGURE 1
PUYE RESERVOIR
FIGURE 2
LLAVES RESERVOIR

Drawn — —
Wiseman
Turney

Embankment
3' High Inside

Iron Pin

4.5' High Outside

Mound.
Sherds, Rocks

Estimated 7' Silt

Breached Spillway
150' = 45.7 M.

Water Flow

Grass,
Sage

Runoff
Estimated At 85%

Capulin Creek

Cut Bank

10, 15, 20, 25, Deep Etched Wash

Sites 1000'

Sites 4000'

Approximate Scale 1" = 50'
March 1983
Elevation 6950' MSL

N

0'
50'
100'
GCD. This site has been visited over a period of years during different seasons of the year. Only once, in August of 1983, was the reservoir found to be dry. Of interest is the apparent well to one side where water could have been obtained without the water carriers muddying their feet. In addition to domestic use, there probably was enough water for limited construction purposes.

Hueco Tanks: Hueco Tanks State Park is located some 35 miles east of El Paso. There is archaeological evidence of prehistoric cultures from Folsom Man through the El Paso Phase of the Mogollon culture (Davis 1974: 4). Comanche Cave contains a natural cistern some 75 feet from the entrance. The cistern is located underneath a very large boulder and is filled by 98 percent run-off through a rock fissure. The cavity is approximately 40 feet long, 10 feet deep, with the width varying up to 10 feet. Access to the cistern is up a slope in the dolomite rock. In the natural weathered state dolomite has a rough surface texture. On the access slope to the cistern, the rock is highly polished from the many persons obtaining water from the cistern. The cavity is apparently water tight as no leakage is evident. On the east wall, near the entrance, are two painted Awanyus, approximately 12 and 6 feet in length. Neither has horns nor plumes. Comanche Cave contains numerous excellent rock art paintings and bears a historic date of 1849. No algae will grow in the cistern due to the lack of sunshine, leaving the water always clear and cool. The cistern would have provided water for some 120 persons for 60 days at the rate of 1.75 GCD.

Casas Grandes, Mexico: During the Buena Fe Phase (DiPeso 1974: 344-353) a well designed reservoir was constructed. This reservoir was fed through a constructed canal from thermal springs some four miles distant (5.4 km). DiPeso was not sure of the purpose of the reservoir, stating that it could have assured a constant supply or served as a settling basin. When the writer visited the springs, the water was quite clear; settling would only have been required if storm water had broken into the supply canal. The water supply was not only used for domestic purposes but also for building the thick-walled pueblo. Also, because of the high culture that existed at Casas Grandes, water consumption was most likely greater. A daily consumption of 4 gallons per capita per day is possibly a more realistic figure. Unfortunately, no measurements were made on the capacity of the canal. Also, the Casas Grandes report unfortunately does not give the elevation of the outlet to the reservoir. The report does state there was no devise for draining the reservoir, although there did appear to be a wood control gate on the outlet. It is my belief that the reservoir could have served to operate on the fill and draw method used in present-day municipal water system design. That is, daily water usage would exceed the capacity of the supply canal, and the reservoir would fill during the night time when usage decreased. Also, the reservoir could have served as an emergency supply if the canal were severed by an enemy. On the basis of a 10-day supply at the rate of 4 gallons per capita per day, the reservoir could have supplied some 700 persons. If the demand were reduced to 2 GCD, then 1,300 persons could have been supplied for 10 days. The reservoir may have served also as a general watering place such as the fountains of Rome. Regardless of the use, the reservoir and canal are an excellent example of engineering design and construction.
SUGGESTIONS ON FUTURE SITE STUDIES

The individual on the ground is in a better position to determine a source of water supply for a prehistoric site than later in a laboratory. It is suggested that when a site is being studied, that the archaeologist include his thoughts regarding the domestic water supply, along with such recommendations he may feel are appropriate for future study. There must have been a source of water or there could not have been human habitation of the site. Local persons such as County Agents, SCS personnel, and ranchers could also be questioned as to their opinions. It might be in order to study jars which would have been used for carrying water, or storing water in dwellings. Reservoirs should receive careful survey maps and silt studies to determine volume, along with soil information. It appears a very interesting field in archaeology is available for study; it deserves much greater attention!

WORDS TO REMEMBER

Coefficient of Run-off: The difference between the amount of water that falls on an area of ground during a storm, and the amount that reaches a stream system. Losses are from infiltration and transpiration, expressed as a percentage of the intensity of precipitation.

Drainage Area: The area of a drainage basin or watershed expressed in acres, square miles, or other unit of area.

Embankment: A main raised structure of earth or earth and gravel to hold or divert water.

Impervious: Impermeable to water.

Percolation: The flow of water through the interstices or pores of soil.

Precipitation: Total measurable supply of water received from clouds as rain, snow, hail or sleet expressed as depth in a day, month or year.

Run-off: Total quantity of water transmitted through natural surface channels.

Spillway: An opening in or about a dam for the escape of excess water.

Spoil, in construction: Material removed by excavation.

ACKNOWLEDGMENTS

For obvious reasons, Al Schroeder was not consulted in the preparation of this paper. However, it was Al's interest in prehistoric reservoirs that provided the inspiration. Thank you, Al! I particularly wish to thank Regge Wiseman for his patience, constructive criticism, and guidance; Stewart Peckham and Landon Smith for their review and comments; Charlie Steen for his discussions of the Pajarito Plateau dams and water devices; Marina Ochoa, Curator, and Laura Holt, Librarian, for their time and assistance; and to the many persons with whom I have discussed the project. I also wish to thank my wife, Mary, for assisting me in the field, and her cheery solutions to my many dilemmas while working on the project.

Santa Fe, N.M.

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BALLCOURT OR RESERVOIR?

PAUL H. EZELL

INTRODUCTION

On a day in 1697, two men observed something in the Southern Arizona desert, and each set down his description of it. Those descriptions are compared and examined for the possibility that a hitherto unexamined Hohokam antiquity may lie beneath the waters of Picacho Reservoir in Pinal County, Arizona (Figure 1).

In November, 1697, Captain Juan Mateo Manje escorted Father Eusebio Kino on one of their many trips through Sonora and Arizona (Fernandez 1926: 246). Since they were joined on this trip by Captain Cristobal Martin Bernal, leading 22 soldiers, we have three accounts of this visit to the valley of the Middle Gila River.

They had visited the ruins, now Casa Grande National Monument, which Manje (Ibid., pp. 252-253) described in considerable detail. They had then gone on west to the three nearest Gila Pima settlements and were on their way back to their bases in the south.

Both Manje and Martin set down in their respective journals accounts of what they saw that November 22, 1697. Apparently it did not impress Kino, for he wrote nothing about it. Both accounts are quoted in the Spanish used in the sources from which they were obtained in order that any reader who desires can start from the respective accounts. The Manje description is the paleographic version by Fernandez del Castillo (1926); the Martin description from the Documentos para la Historia de Mexico compiled by Fr. Francisco Garcia Figueroa. Although neither is the original manuscript from which it was taken, both are as close to that original as I can get at this time. Following are my own translations since the Martin report has not, to my knowledge, been published in English, and I translate Manje somewhat differently from Karns (1954: 90-91).

To avoid proliferation of reference citations let me instead note that, for problematical words and/or constructions, I drew on the Academia Espanola (1936), Santa Maria (1959), and Velazquez (1945).

As those who have worked with such accounts know, distances traveled and directions given are seldom precise enough to support categorical conclusions. Following the distances and directions given too literally, if there are no known landmarks such as Casa Grande to use as a check, lead to errors of interpretation and conclusion.

Let us begin with Manje's account:

En 22 de noviembre, salimos por llanos al rumbo del Sur, y andadas 4 leguas, llegamos a un estanque o aljibe [sic—aljibe] de agua, hecho a mano más que cuadrado o parallelogramo de 60 varas de largo y 40 de ancho, sus bordos pareceen paredes o pretil de argamasa o cal y can- to, según lo fuerte y duro de la material, y por sus cuatro ángulos o esquinas hay sus puer- tas como atarjeas por donde se recoge y conduce el agua llove- diza de que está lleno, sino que sea algún conducto subterráneo incógnito que venga, y se vé desde el río, pero está distante 6 leguas para creerlo; aquí bebió la caballada que la noche y tarde antes no había bebido y nos dijeron los indios guías lo
Route Map for Kino-Manje-Martin party, November 18-22, 1697.
hicieron los mismos que fabricaron las casas grandes... (Fernandez 1926: 255).

On November 22 [1697] we left over plains in a southerly direction and, having traveled 4 leagues [ca. 7.2 miles], came to a cistern or pond of water, well made, more like a square or a parallelogram, 50 varas [ca. 45.8 yards] long and 40 varas [ca. 46.6 yards] wide. Its sides resemble walls or breastworks of mortar or a wall of rough stone and mortar, judging by the strength and hardness of the material. At its four angles or corners there are gates like small drains through which rainwater, with which it is full, is collected and distributed, unless there be some unknown subterranean conduit which comes from the river. But that is hard to believe, for the river is 6 leagues [10.8 miles] away. Here the horse herd, which had not drunk during the afternoon and night before, drank. The Indian guides told us that the same people who built the big houses built it [the tank].

Martin’s report (Garcia 1858: 805-806) differs in some respects from that of Manje:

The following day of the current [month—Novem-ber, 1697] I marched out. At about five leagues, I found a water hole with very little water, which the aforementioned D. Juan de Palacios and a pagan and other officials who came in my company told me that those who long ago built the big house made this tank where, there being rain, some portion is collected. Said tank is in a flat, cleverly joined to a little arroyo so that the water enters it. The side is of the earth itself [i.e., made of earth the same as the surrounding soil] and has a circumference of about two hundred varas. The valley is very sterile and dry, so that it has not even pasturage;

Manje visited the feature once more and set down a little more in the way of description of it (Fernandez 1926: 270).

En 5 [March 1699], dejando ya el río y Casas grandes a la izquierda y a espaldas, caminando al Sueste a 9 leguas, llegamos al estanque o aljibe de agua que [sic—que] hicieron los mismos que fabricaron la gran población de las Casas grandes cuando salieron de la región de Norte a Noroeste a poblar a México; es poco más que cuadrado y hondo y se mantiene siempre mucha copia de agua aunque estancada.

On the 5th [March, 1699], leaving now the river [Gila] and big Houses to the left and
behind, traveling toward the Southeast, we arrived at the cistern or pond of water which the same people made as built the great center of the big Houses when they left the region of the North to Northeast to settle Mexico. It is a little like a square and deep and always contains a great quantity of water, although stagnant.

In comparing these accounts it has proved useful to summarize elements of description of the several attributes of the structure described according to who set them down. Examination of Figure 2 shows two conflicts in reporting between Manje and Martin. One is the disparity between the distance of the feature from the river; it is not possible to be sure whether Martin reported the distance as from the river or from Tusoni Moo. The other is the technique of construction; Manje stated that the walls of the enclosure were of some kind of masonry, Martin that they were earthen walls. Two other differences in reporting are not conflicts but just differences. Manje wrote of four conduits, one at each of the four corners of the structure, but nothing about the setting. Martin did not note the conduits, but did note that the structure was in a swale and "cleverly joined to a little gully," i.e., he saw the gully as having been incorporated into the whole system. Their different ways of recording dimensions appear to be without significance; while it is not possible to convert Martin's figure for the circumference, assuming that the feature was quadrangular in plan, Manje's figures can be converted to give a circumference exactly the same as given by Martin.

In contrast to their differences, Manje and Martin agreed on some points which, to me, have more significance than their differences. They agreed that the structure was man-made, not natural; that the sides of the feature were distinguishable from the surrounding soil; they agreed on the size of the structure (I cannot speak as to the lengths of the sides), and that the purpose of the structure was to collect rainwater. So there was something out there in Arizona south of the Casa Grande and the Gila River which seems to have escaped subsequent mention except by Sedelmayr in 1746, when he borrowed Manje's 1697 words (MS:f. 4v). While the evidence that he visited it is not incontrovertible, I am inclined to think he did.

If those conclusions be accepted, and obviously I accept them, then a number of questions present themselves. Among them the following are most interesting to me, but doubtless many more than these can be adduced.

What was it? Where was it? Why has it not been reported, so far as we know, since 1746?

While Manje and Martin appear to have answered the question of what it was, another possibility is that the structure had been built for some other purpose and, after abandonment, became a reservoir as a result of natural processes. An example of such a structure would be a Hohokam ballcourt, something which would probably not have been recognized by Spaniards of the 18th century. Turney (1929) identified as "Reservoir" a feature in Townships 33 and 34 South which, from its outline, was most probably a Hohokam ballcourt (Gladwin et al., 1938: Pl. VI and p.37, Fig. 11). Unless we are able to dismiss Martin's observations that the feature was located in a swale and, more importantly, that it had been deliberately connected with a little gully, such explanation loses plausibility.

To attempt answers to the two other questions we have to return to the point where the expedition left the Gila and trace their probable route in greater detail. To do that, it is essential to establish as closely as pos-
### Figure 2. Summary of descriptions of feature.

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Manje, 1697, 1699</th>
<th>Martin, 1697</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>South of Gila</td>
<td>South of Gila</td>
</tr>
<tr>
<td>Distance from</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tusoni Moo</td>
<td>12.6 miles (1697)</td>
<td>14.4 miles or</td>
</tr>
<tr>
<td>Distance from</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gila River</td>
<td>10.8 miles (1697)</td>
<td>14.4 miles</td>
</tr>
<tr>
<td>Character</td>
<td>man made</td>
<td>man made</td>
</tr>
<tr>
<td>Construction</td>
<td>rough masonry</td>
<td>earthen sidewalls</td>
</tr>
<tr>
<td>Plan</td>
<td>rectangular or parallelogram?</td>
<td>not noted</td>
</tr>
<tr>
<td>Dimensions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(of sides)</td>
<td>45.8 yards x 36.6 yards</td>
<td>not given</td>
</tr>
<tr>
<td>Circumference</td>
<td>not given; calculated at 183.6 yards</td>
<td>183.6 yards</td>
</tr>
<tr>
<td>Depth</td>
<td>&quot;deep&quot; (1699)</td>
<td>not given</td>
</tr>
<tr>
<td>Setting</td>
<td>not given</td>
<td>in a catchment basin</td>
</tr>
<tr>
<td>Water source</td>
<td>rains</td>
<td>rains</td>
</tr>
<tr>
<td>Engineering</td>
<td>conduits at each of 4 corners to receive</td>
<td>fed by a small gully; nothing about</td>
</tr>
<tr>
<td></td>
<td>and distribute water</td>
<td>distribution of water</td>
</tr>
</tbody>
</table>
sible the point at which they left the Gila River and headed southward. To that end the story is picked up at their departure from Casa Grande to go on west down the Gila. In Manje's account (Fernandez 1926: 253) one must infer that the Spanish party had left Casa Grande, for he merely noted for November 18, after describing Casa Grande, that:

... a las márgenes del río distante una legua de las Casas grandes, hallamos una ranchería (al margen Tucsan) ....

On the banks of the river one league [1.8 miles] distant from the big Houses we found a rancheria (in the margin of the sheet, Tucsan)....

Martin (Garcia 1858: 804-805) gave more details:

... y estando en la dicha casa llegaron tres gentiles, cabezas de una ranchería que asiste en este río, ... ofreciéndonos que fuéramos, donde nos esperaba su gente ... y salimos en compañía de ellos y hallamos la gente en dos filas ... nos tenían mucho mezquite molido, y un pan y agua. Concluido esto nos llegamos á la orilla del río á hacer noche, ....

... and being in the said house [Casa Grande] three gentiles came, headmen of a rancheria which is present on [in the sense of "close by"] this river ... inviting us to go to where their people awaited us ... and we left in their [the three headmen's] company and we found the people in two files ... they provided us much ground mesquite and a loaf of bread and water. Having finished that we got to the bank of the river to pass the night, ....

Note that Manje specified one league, a little short of two miles, from Casa Grande to the rancheria, Tucsan, but noted nothing about going on beyond it to the Gila, whereas Martin gave no distance but conveyed the impression that the party went beyond the rancheria to the bank of the Gila. That Martin gave no distance for either is interpreted to mean that the distance traveled was so short as not to be worth noting; what stands out is that the party went on beyond the rancheria to camp. And, although neither gave a direction, Figure 1 shows that they would have had to go westward if they were not to walk into the river, no matter how the river may have changed its channel since then. As they did not report crossing the river, it can be assumed, then, that Tucsan was located on the south side of the Gila northwest of Casa Grande Ruins.

The following day, November 19, they went west down the river to the next Gila Pima community, both recording a journey of 4 leagues [7.2 miles]. Because Manje repeatedly specified that they traveled "over plains," and because the banks of the river were grown up with cottonwoods and willows, it is clear that their route was not right along the river. Manje recorded the name of this settlement as "Tusoni Moo"; Martin did not give it a name until the 21st when, apparently as an afterthought, he called it "Santa Isabel" (Fernandez 1926: 253; Garcia 1858: 805, 806). As it was not reported that the expedition crossed the river, it is assumed that Tusoni Moo also lay on the south side of the river. Here they left the horse herd, in charge of an unspecified number of soldiers, to recuperate on what pasture was available (Fernandez 1926: 253; Garcia 1858: 805). The rest of the party went on west 7 leagues [12.6 miles] (recorded only by Manje), still
on the south side of the river, to the rancheria of San Andres or Sudaison.

Returning eastward on November 21, Manje again recorded a journey of 7 leagues [12.6 miles] east to where "... we joined up with the soldiers who had remained with the horse herd at the rancheria of Tusoni-moo" (... nos incorporamos con los soldados que habían quedado con la caballada en la ranchería de Tusoni-moo) [sic―Tusoni Moo8]. Martin specified (Garcia 1858: 806) that the "... stopping place next before referred to where the horse string remained, which is called Santa Isabel. I did not stop, but passed by said stopping place ..." (... paraje antecedente referido donde quedó la caballada, que se llama Santa Isabel, y no paré sino que pasé de dicho paraje ...). The location of Tusoni Moo is important for, even though Manje did not state that they got to it and Martin specified that they passed by it, both mentioned it in connection with Manje's record (Fernandez 1926: 255) that in its vicinity the expedition turned from an easterly heading toward the south and away from the river.

In this connection, one can assume that the horses were not being pastured right in the rancheria, but on the plains to the southwest of the rancheria, and indeed Manje specified that both going and returning they traveled over "plains," not along the river bank. That he logged the same distance returning from San Andres as going probably means that they changed heading when about even with Tusoni Moo. Turning to Figure 1, it can be seen that at about that point they would have been able to double the Sacaton hills, through which they would not have forced tired animals, and swing around toward the south.

Picking up the journey at that point with Manje's account: "... and continuing toward the south by a different road from that by which we had come, ..." [emphasis added] (... y prosiguiendo al Sur por otro camino del que hablamos llevado, ...), it is apparent that they changed their direction. To continue the story with Manje's record: "At 3 leagues [5.4 miles] we stopped to sleep in an uninhabited place without water, but with good pasturage for the cavalcade, leaving now at our backs the big houses" (A 3 leguas, paramos a dormir en un despoblado sin agua, más con buen pasto para la caballada, dejando ya a espaldas las Casas grandes). Martin (Garcia 1858: 806) gave the same distance and noted the dry camp without giving any heading. The dry camp, then, was most likely on the plain southwest of, but not in proximity to, Casa Grande, thus clarifying the comment that they were now leaving the big houses "at our backs."

Plotting Manje's distance recorded the next day on a heading due south places the party about 6.6 miles due west of the one feature of the landscape which could have been a catchment basin in that locality—Picacho Reservoir—so I submit that they traveled, not due south, but continued on the heading they had followed from the Gila. That Manje's recorded distance (4 leagues, 7.2 miles) on that heading would have left the party almost exactly 2 miles short of Picacho Reservoir should occasion no dismay; I have seldom had one of these reports check out even that accurately. I conclude, therefore, that the most probable interpretation of the evidence available is that the location of Picacho Reservoir was that of their "cistern" or "tank."

A look at Figure 3 will show the reason. It is obviously a natural catchment basin, fed by run-off from the Picacho Mountains to the east and south, which has probably held a pond for most of the year for several thousand years. That is why Picacho Reservoir has continued to exist in spite of not being on even a major intermittent watercourse such as Santa Rosa
Wash just west of the town of Casa Grande. And, although at least 10 washes can be counted draining into the reservoir, the "little gully" noted by Martin is most likely to have been the one called "Brady Wash" today.

The question, "why has no structure ever been reported there" is easier to answer than the question of "where was it." For one thing, it lay off the main road from Tucson to the Gila Pima villages so, in a sense, it is surprising that it was recorded at all. That route lay approximately three miles west of the reservoir, reaching the Gila ca. five miles west of Casa Grande, so that the few travellers wishing to see the ruins had to make a side trip to do so. It is not surprising that none made a similar side trip to see something of which they probably had never heard.

Another reason for its having gone unnoticed lies in the attitude of the settlers of the area. From Hispanic times until the 1930s the Hohokam ruins were regarded at best as curiosities, when they were not regarded as nuisances to farmers. Barnes (1935: 330) noted Picacho Reservoir as appearing on "U.S.G.S. Map, 1923," and that it was part of the historic Casa Grande Canal System. The modern reservoir may, therefore, have been created as early as 1868 as a consequence of the diversion of Gila River water by the Ashurst-Hayden Diversion Dam and Florence-Casa Grande Canal (Globe Equity No. 59 1935: 14).

Except to satisfy curiosity there appears little to justify devising some means of testing the hypothesis that the ruins of some structure once occupied part of the area now covered by Picacho Lake. Over the years, those waters may well have dissolved those walls if they were earthen as Martin thought. If they were a form of masonry, stones laid in mud mortar, for example, those stones might mark where the walls once were. As repeated cleaning of the reservoir would at least have disarranged, if not removed, them, there seems little hope that anything remains to be found by underwater investigation.

ACKNOWLEDGMENTS AND NOTES

Thanks to the sympathetic and understanding help of the personnel in the National Archives and the National Library in Mexico City in 1952, Greta (my wife) and I were able to locate and retrieve a great many more unpublished and/or out-of-print documents than would have been the case otherwise. Not only that, owing to their help we even learned to read the 17th and 18th century script and were given help in deciphering passages which, owing to archaic construction, seemed meaningless at first.

I wish also to thank Greta for the hours she put in at tedious tasks such as critical reading and proofing this manuscript. Errors and opinions remain my own, however.

1 From tabulation of all Manje's measurements between points identifiable today Greta has established that over long journeys his league was consistently 1.8 miles, instead of the 2.5 mile equivalent of the league usually used. This figure is used here although, owing to the short distances involved, it is not that reliable. Since we have much less comparable data for Martin and as, with one exception, when he reported distances they were the same as those reported by Manje, we have used Manje's figures for Martin also.

2 Without access to the manuscript version one cannot determine whether this might have been an error of transcription on the part of myself or Fernandez rather than a spelling error by Manje since, later in the record for 1699, it is spelled correctly.

3 As with the league, the length of the vara depended on the user. It
is doubtful that the measurement is critical in this case. The Spaniards probably paced it off at best and the points between which the measurements were taken were not likely, after a couple of centuries or so of erosion, to have been all that definable. For those reasons the vara of 33 inches (Velazquez 1945: 646) is probably accurate enough.  

4 In writing of this possible underground conduit from the river to the reservoir, Manje used a construction connoting irony.  

5 Dobyns 1974: 317-327.  

6 Translation of "justicias" as "officials" rather than "justices" gives a modern connotation more closely approximating its usage in 17th century New Spain.  

7 Manje seemed to have found reason to qualify his 1697 observation of the plan of the feature.  

8 I have preferred to keep to Manje's original spelling as being closer to the Pima tchurshonyi mo'o (Morago 1954).  

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Turney, Omar A.  

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This paper continues our publication of ethnohistorical, archaeological, and ethnographic studies of the Pai Indians of northwestern Arizona (e.g., Dobyns and Euler 1960, 1967, 1970, 1971, 1976; Euler 1974, 1975). Archaeologists have recently begun turning at least minor attention to the prehistory of this region, not really examined in detail since the 1950s. In doing so, some have repeated the mistakes of the surveys of the 1930s in that they tend to examine sites in a synchronic fashion. They have not used a direct historical approach—working from the known to the unknown—nor have they had a firm grasp of the true nature of the material culture upon which they depend for cultural inference (e.g., Linford 1979). Our long-term studies of the Pai have largely been ethnohistoric; that is, through a direct historical technique we have tried to meld history, ethnography, and archaeology to present a picture of the dynamics of Pai cultural change (or lack thereof) backward through time. This, to us, seems to be the essence of what has come to be termed ethnoarchaeology. Without entering into current ethnoarchaeological debates (Gould and Watson 1982), we would stress the holistic and integrated approach that the use of these three disciplines permits. While it has been brought to our attention that the term "ethnoarcheologist" was used first by Fewkes (1900: 579), the word as now conceived is relatively new. This does not necessarily make a new technique; we have been doing it for a long time (Dobyns 1956; Euler 1958).

Pai cultural diagnostics as recovered archaeologically are few. Ceramics, milling stones, and possibly projectile points are the ones that appear important. We have described Pai milling stones at some length (Euler and Dobyns 1983). Now we detail the important diagnostic of ceramics¹. Our most firm data come from those Pai bands now incorporated in the Hualapai Tribe. We have almost as good information on the ceramics of Pai bands now spoken of as the Havasupai. Parenthetically, this bifurcation of what was once a single aboriginal tribe—the Pai—composed of several congeries of bands did not come about until decreed by United States government fiat in 1882 (Dobyns and Euler 1970).

The Walapai Indians (to use the ethnographic spelling) are a Yuman-speaking people who now reside in the Arizona towns of Kingman, Hackberry, Valentine, Peach Springs, and Seligman, along the route of U.S. Highway 66 and the Santa Fe railroad. Their reservation encompasses 997,000 acres although they formerly inhabited a large region of several million acres south and east of the Great Bend of the Colorado River.

No Walapai now makes clay vessels. The art was thought to have died out before 1908 (Curtis 1908: 93). Yet, historic records indicate that these Indians formerly produced them. Captain Lorenzo Sitgreaves’ government exploring expedition saw Walapais on Truxton Creek in 1851. An artist accompanying the party depicted them cooking in a globular, vertically necked jar (Sitgreaves 1853: Plate 17). During the Walapai War, 10 “earthen pots” were destroyed at a Walapai rancheria overrun by United States cavalry on October 16th, 1867 (U.S. Senate 1936: 60).

Until the authors began their studies, however, no whole vessels of identifiable Walapai pottery had been
recognized, nor had archaeologists definitely identified Walapai sherds in collections of several earlier surveys which had been conducted in territory Walapais had held in historic times.

An attempt had been made in 1929 to gain information about Walapai ceramic techniques by the Laboratory of Anthropology expedition in ethnology under the charge of A. L. Kroeber (1935: 36). Two Walapai women were induced to attempt to make clay vessels. They surely had only oral tradition to go on, perhaps aided by vague memories of having seen pots made in their childhood, but having had no actual experience in pottery making. The vessels produced are preserved at the Laboratory of Anthropology, Santa Fe. They bear little resemblance to the pottery which we have identified as having formerly been made by Walapai potters, particularly in paste characteristics and surface finishing.

We have succeeded in identifying the pottery made in former times by Walapai Indians through both ethnological and archaeological techniques and also in dating with some precision the period of production of this ceramic ware.

During our research we learned that Mrs. Lillie Wilder of Peach Springs actually possessed a Walapai clay vessel. This elderly Walapai lady had been presented this jar by her parents-in-law upon her marriage into the relatively isolated and conservative Pine Springs band about the turn of the century. She and her family had continued to live in wickups for many years in the Pine Springs-Diamond Creek-Prospect Valley area on the south rim of the western Grand Canyon, ranging over the plateau to Wau Wila Ha' and Ikisa Ha’ in the upper Chino drainage (Figure 1). When she finally came to Peach Springs to live with relatives, she cached the jar at the last wickup in which she had lived. Later, she decided to recover the vessel so it could be buried with her when she died.

After lengthy persuasion by members of the Hualapai Tribal Claims Research Committee, the Tribal Council, and the authors, Mrs. Wilder agreed that this unique known Walapai vessel be deposited on indefinite loan at the Museum of Northern Arizona until such time as the Hualapai Tribe had its own cultural expertise.

This jar (Figure 2) was the first whole vessel discovered of Aquarius Brown, a type of Tizon Brown Ware named and described by H. S. Colton (1939) and later revised by us (Dobyns and Euler 1958). The surface was originally finished somewhat more smoothly, perhaps, than was typical of Tizon Brown Ware scumming. In spots, this surface finish had been worn away in a manner typical of sherds of this ware, exposing an Aquarius Brown paste and temper.

Mrs. Wilder informed us that her mother-in-law specifically told her that this vessel had been made by a Walapai woman; she was interviewed on the subject by both of us more than once each, separately, without altering her statements. So this Aquarius Brown vessel constituted the strongest type of evidence that this type had been made by the Walapais, and within post-contact time. By inference, so were other types of Tizon Brown Ware occurring archaeologically.

Meanwhile, during the months before this known Walapai jar was recovered, our archaeological surveying was carried ahead with the objective of identifying by archaeological techniques the pottery formerly made by Walapais. The procedure followed was to visit sites known to Walapais to have been occupied by them personally or by their immediate ancestors, and there to look for ceramic evidence, among other attributes. The bulk of the ceramic sites in this region are located near springs which have been utilized probably as long as Indians
Map of Pai territory showing major sites referred to in the text.

Figure 1 - Locations in Yavapai and Pai Aboriginal Territory Mentioned in the Text.

1. Hackberry
2. Valentine
3. Peach Springs
4. Seligman
5. Pine Springs
6. Diamond Creek
7. Prospect Valley
8. Wau Wila Ha'
9. Ikisa Ha'
10. Mineral Park
11. Ghost Dance Site
12. Fort Rock
13. Camp Hualapai
14. Ha' Loo
15. Cerbat Mountains
16. Mata Widita
17. Peach Springs Canyon
18. Oya Sivli Klavalava
19. Whala Ki Tev Giova
20. The Lagoons
21. Pasture Wash
22. Peeples Valley
23. Yava
24. Cherry Creek
25. Harcuvar Mountains
26. Turkey Creek
27. Bradshaw Mountains
28. Agua Fria River
29. Kingman
30. Supai Village
have inhabited the area. Sherds from the surface of such sites, however, were of little use in identifying Walapai pottery, since remains of the earliest inhabitants might occur on the surface with remains of the latest.

To yield the desired identification, sites had to meet certain standards. They had to be located where occupation was short and left little cultural debris, unmixed with that of any other occupation. They also had to be situated where the dates of occupation could be independently established, either by documentary records or oral tradition or both.

We succeeded in locating four such sites. All were known historic Walapai camps where Walapais still living in the 1950s or their deceased relatives lived while working for or visiting Anglo-American miners or ranchers. There is no reason to suppose that Walapais lived on the specific site before the establishment of the Anglo-American settlement; Walapai informants in fact denied that they did. So far as can be determined, these were all purely post-settlement sites occupied by Walapais after mining operations began in Mohave Country in 1871 and before about 1900.

MINERAL PARK
(Ariz. F:12:2)3

Some mineral deposits at Mineral Park in the Cerbat Mountains had been prospected during the War of the Southern Rebellion, but the Walapais drove the prospectors out. A town was not established until the spring of 1871 after the defeat of the Walapais by United States troops (Wheeler 1872: 53-54). The Walapais had some contact with the miners from that time until their forced removal to the Colorado River Indian Reservation in 1874. When they fled in the spring of 1875, Mineral Park was one of the mining camps where they sought work in their effort to sustain themselves within their ancestral territory (U.S. Senate 1936: 112). The advantages of cheap native labor were not lost upon the mine operators (Alta Arizona 1882: I:24), and Walapais settled as a permanent ethnic feature of the camp.

Site Ariz. F:12:2 was located on the slope above the Anglo-American part of the town. It consisted of a ring of stones mostly covered with washed-in soil which evidently once held in place the brush covering a circular wickiup. The area where it was located was identified by Walapais as the residence area of Walapais who worked in the town's mines and business establishments.

In surface association with the house ring were tin cans, various sherds of colored glass, iron buttons, and square, wrought-iron nails together with 18 Indian-made ceramic sherds. Thirteen of these were Lower Colorado River Buff Ware (three Parker Buff, Fort Mohave Variant, 10 Needles Red-on-Buff) made by the Mohaves. The Walapais said that although some Mohaves were employed at the mines, they camped around an old store building somewhat down the slope from the main part of town on the opposite side from the Walapai settlement. The Walapai propensity for importing Mohave pots is still well-remembered, and the Lower Colorado River Buff Ware types found on this site are undoubtedly trade ware.

The other five sherds recovered were of two types of Tizon Brown Ware: Cerbat Brown and Sandy Brown, originally named and described by Colton (1939: 8, 11). Thus, these two types were identified as having been made by Walapais and used within post-settlement times.

THE GHOST DANCE SITE
(NA 3365; Ariz. F:12:8)

Ghost Dance ceremonials were held by the Walapais in 1889-91 across the Cerbat Mountains from Mineral
Park at the western foot of a small prominence called Gila Monster's Hill in Walapai. This site is a couple of miles from the nearest water which is farther toward the center of the Cerbat Mountains at Koara Spring. So far as is known, this place was inhabited only by Walapais during the two years that Ghost Dance performances were staged there, after the spring where the Walapais had lived in pre-settlement times had been seized by Anglo-American cattlemen.

At the time of our fieldwork, living Walapais were still able to identify fire-oxidized spots in the soil of the flat just west of the hill with fire-places of various groups attending the ceremonials. Several stone rings marked the location of wickiups. These seem to correspond to the "hillside forts" recorded here by Museum of Northern Arizona surveyors in 1938. A good many old wine bottles and metal objects were observed on the surface, although the previous surveyors had collected the more impressive artifacts. They also recovered 16 Indian potsherds. Three were Needles Red-on-Buff, again demonstrating post-contact production of this Mohave Lower Colorado River Buff Ware type. The other 13 sherds were Sandy Brown, thus confirming the finds at the Mineral Park site.

FORT ROCK (Ariz. G:15:5)

Another site occupied by Walapais working on a ranch during the 1890s was located on top of a hill along a flowing creek near Fort Rock on the plateau.

This hilltop site yielded such Anglo-American manufactured artifacts as a metal bed-post knob, iron spoon, brass harmonica reed, broken rifle, iron pots, a stove, glass and procelain sherds. Sixty-three Indian made potsherds were also recovered. Fifty-nine were Parker series of Lower Colorado River Buff Ware (mostly Parker Red-on-Buff with some unpainted and stuccoed sherds). The other four sherds found were Cerbat Brown, confirming the identification of this Tizon Brown Ware type as having been made in post-contact time by Walapais.

CAMP HUALAPAI (Ariz. N:1:9)

An army camp was established on Walnut Creek, a permanent tributary of Chino Creek, during the 1866-69 Walapai War. Although Walapais could not have visited this hostile camp during the war, they did come in to receive rations after peace was established. Some apparently spent at least a few days camping here, for rock rings remaining from holding wickiup brush coverings in place were recorded at one margin of the army encampment area. At two of these, Tizon Brown Ware was the dominant pottery, including all three of the most widely made types: Cerbat, Aquarius, and Sandy Brown. Some Needles Red-on-Buff, imported from the Mohaves, and some Southern Paiute indented sherds were also recorded.

The ceramic characteristics of these four post-1871 sites presented a clear identification of Walapai pottery as having been types of Tizon Brown Ware. The remains from these sites also fixed to some extent the time when this ware was going out of production and use among the Walapais, confirming conclusions drawn from Walapai oral traditions of pottery production.

HA' LOO ROCK SHELTER

One other surveyed site, a rock shelter in Spencer Canyon which Walapais occupied within the lifetime of the oldest surviving Walapai, yielded approximately half a whole jar of Aquarius Brown (Figure 3). This vessel was recovered from the surface of the site by a member of the Land Claims
3. Aquarius Brown jar from Ha' Loo rock shelter.
   Height of vessel is ca. 28 cm.
Research Committee in whom the authors place implicit faith.

Other Tizon vessels have been recovered within Walapai territory but, because of conditions under which they were found, could not be directly associated with Walapai. The first of these was a shallow bowl of Cerbat Brown (Figure 4), recovered a number of years ago by a rancher who saw it eroding from a small wash on the eastern flank of the Cerbat Mountains. No other cultural manifestations were located even though the site was revisited by one of us. Technically, this bowl conforms to Colton's published description of the type. It was constructed by the paddle-and-anvil method, and anvil marks show clearly on the interior surface. Although Colton (1939: 9) suggested that a variation of Cerbat Brown "showing paddle marks on the surface" tentatively be called Kingman Brown, it is felt that the presence of clearly visible paddle and/or anvil marks alone should not be sufficient cause to remove sherds from the classification of Cerbat Brown which, admittedly, was thinned by that method.

The second vessel was a deeper bowl of Aquarius Brown which had been included with a flexed burial in the sacred cave (Ariz. G:2:4; NA 5470) in Mata Widita Canyon (Euler 1958). This burial figures prominently in the Walapai origin myth as being that of their "first chief." Although the vessel was examined in situ, it was not removed. It is our opinion that the vessel is Walapai, interred with the burial about A.D. 1250-1300 on the basis of

4. Cerbat Brown bowl from the Cerbat Mountains. Height of vessel is 9.0 cm.
The design on a painted blanket wrapped around the skeleton, and sherds found in a test pit excavated in the cave floor. The cotton blanket was painted with a design very similar to that of the middle Pueblo III Anasazi ceramic type Tusayan Black-on-White (Euler 1958: 230), which has dates of its greatest abundance at a similar time (Breternitz 1966: 99). Intrusive sherds in the test pit were Tusayan Polychrome, dating ca. A.D. 1075-1280 (p. 100). The skeleton may be the remains of a Hopi (Kayenta Anasazi) trader who died en route to the Mohave villages or while visiting the Walapai in their canyon home; most Walapai were cremated until late in the 19th century.

A deep Cerbat Brown bowl (Figure 5) was found at a camp site (Arizona G:7:17) in Peach Springs Canyon, very possibly the location where Lieutenant Ives (1861: 100) saw a Walapai encampment on his 1858 reconnaissance.

There is little question that these three specimens were made by Walapai potters or by their direct ancestors, people of the Cerbat tradition.

IDENTIFICATION BY EXCAVATION

Burned Wickiup

In Mata Widita Canyon, Euler (1958) excavated a mound up-canyon from agricultural fields formerly irrigated by Walapais with water from the large spring. The last family to occupy the last known dwelling built on this mound was related to two members of the Walapai Land Claims Research Committee. It was designated as Ariz. G:3:3 (survey) and NA 3786C (excavation).

The last structure built had burned and fallen in upon the floor. Under the burned material and on the floor were 13 potsherds associated with half a broken vesicular basalt mesquite bean mortar (the other half was recovered outside); Anglo-American manufactured artifacts included a Mason jar with a 1915 patent date. Twelve sherds were Tizon Brown Ware and one was Lower Colorado River Buff Ware. Native clay vessels were evidently used in this settlement some years after they had gone out of use on the desert to the west.

This excavation confirmed the surface associations of Tizon Brown Ware sherds with manufactured Anglo-American artifacts on the four purely historic sites of known post-1871 date. Excavation found this association in the clearest possible archaeological situation: on a dwelling floor under a burned superstructure at a site known to have been occupied solely by Walapais.

Rock Shelters

Oya Sivli Klavalava (NA 4377). The small Mohawk Canyon rock shelter called in Walapai Oya Sivli Klavalava contained a trash deposit 195 cm. deep. Euler (1958) found the same ceramic association in the levels just below the surface. From surface to 20 cm., some 89 sherds were recovered: 53% unaltered Tizon Brown Ware, 13.5% Mohave trade ware, and 28% the Havasupai variety of Tizon Brown Ware (to be discussed later). These upper 20 cm. probably represented historic occupation of this rockshelter by Walapais and Havasupais. The top half of this level also contained Anglo-American manufactured artifacts obtained by these Indians in post-contact times.

Whala Ki Tev Giova (NA 4378). Euler (1958) also excavated a test pit into the floor deposits of a large rock shelter down Mohawk Canyon from Oya Sivli Klavalava. This shelter had no Walapai name but was referred to by the name of upper Mohawk Canyon, Whala Ki Tev Giova. Only 50 cm. of trash left time relationships of the artifacts recovered less clear cut than
5. Cerbat Brown bowl from Peach Springs Canyon. Height of vessel is 14.0 cm.
in the smaller rock shelter. In the upper 20 cm., unaltered Tizon Brown Ware formed 70% of the sherds recovered, compared to 8.7% Havasupai and 21.8% Southern Paiute Utility Ware. Again, Anglo-American manufactured artifacts were recovered from the upper half of this level.

Ethnographic and archaeological techniques in four contexts identified Tizon Brown Ware as made by Walapai Indians have permitted us to conclude that:

Malcolm Rogers' (1946: 192) statement that brown ware types identified by him as some of Colton's Tizon Brown Ware were made within historic times is correct. We also conclude that Rogers' suggestion that these could be attributed only to Walapais or Chemehuevis must be narrowed down to only the Walapais.

We also conclude that Colton's (1939: 29) statement that Tizon Brown Ware was not made after A.D. 1100 erred by approximately 800 years in fixing this ware's terminal production date.

This identification, correlated with our study of the spatial distribution of this ware on nearly 500 prehistoric and historic ceramic sites in northwest central Arizona (Dobyns 1974) permits us to equate the modern Hualapai Tribe with the prehistoric group labeled by Colton the "Cerbat Branch," which he placed in his Patayan Root. Having made this correlation, we conclude that Rogers' "Yuman Complex" is a more accurate designation than "Patayan." We also state that the Walapais were the major prehistoric occupants of the region inhabited by them at the beginning of Anglo-American contact, but that they did not reach their territorial limits until some time after A.D. 1300.

Havasupai and Yavapai Ceramics

Additional whole pieces of Tizon Brown Ware have been located in the historic ranges of the Havasupai and Yavapai. The purpose of this section is to describe them and to discuss their implications for Arizona Yuman prehistory.

One point should first be made clear. There are few basic cultural differences among the Walapai, Havasupai, and Yavapai, so we suggest that no basic differences in their pottery should be expected.

At the edge of Havasupai-Walapai territory, a whole vessel of Tizon Brown Ware (Figure 6) was collected by Leslie Spier (1928: 138-139), but he uncertainly attributed it to the Havasupai. This large, globular jar excavated at the Lagoons north of Pine Spring, is now in the American Museum of Natural History collections. It is Tizon Brown Ware in all respects except that both interior and exterior surfaces exhibit intentional wiping marks (Figure 7).

Sherds that Dobyns collected from a late 1800s Havasupai wickiup site (Ariz. B:15:7) east of Havasu Canyon near Pasture Wash were of the same variant. The total sample was 26 sherds, all of the Aquarius Brown wiped variety. In addition, we have located in the Sharlot Hall Museum in Prescott a second complete specimen of Tizon Brown Ware showing similar wiping marks (Figure 8). This is a large, wide-mouthed jar, less globular than the vessel from the Lagoons, but similar in type. Unfortunately, we do not know its provenience and mention it here simply to record that a second whole container of this variety exists.

These vessels and sherds formed the basis for describing a new variety of Tizon Brown Ware, Tizon Wiped, which we believe was made by the Havasupai (Dobyns and Euler 1958). Suggestions that Havasupai made the reduced San Francisco Mountain Gray Ware seem to be invalidated by this identification; the latter ware was associated with a non-related prehis-
7. Detail of exterior wiping marks on the Lagoons vessel. Photo courtesy of the American Museum of Natural History.
8. Tizon Wiped jar in Sharlot Hall Museum, Prescott. Height of vessel is 34.3 cm.
toric tradition, that of the Cohonina. The reasons for this invalidation are, to us, as follows:

When our present studies began, the kind of pottery produced by the ancestral Havasupai was even more unknown than that of the ancestral Walapai. This was because, according to Spier (1928: 123), "clay vessels ... were displaced by metal products about 1870" before the United States split Northeastern Pai into Walapai and Havasupai groups. At the same period, Walapais were in the final stages of Tizon Brown Ware production. From oral tradition, Spier concluded that "the only native ware is a small, unslipped and undecorated, coarse brown pot of the type common to all the nomadic tribes of the Southwest ..." The only vessel he recovered was that from the Lagoons. "It is of the type described," Spier noted, "but it cannot be certainly ascribed to the Havasupai because of its somewhat greater size and handles."

Despite Spier's description of Havasupai pottery as brown, indicating that it must have been fired in an oxidizing atmosphere, archaeologists working in the area occupied by the Havasupai in historic times have been tempted to postulate that the Havasupai were descended from the Cohonina, who once lived in the same plateau region (Schwartz 1959). This correlation has been postulated despite the fact that the pottery made by the Cohonina was uniformly a gray ware fired in a reducing atmosphere; only occasionally does it exhibit a tan color, probably indicative of uncontrolled firing. The Havasupai have been derived, on paper, from the prehistoric Cohonina also in the face of the facts that the former clearly speak a Yuman language with less than dialectic difference from Walapai, and that the pottery of all known Yuman-speaking peoples is either brown or buff; in other words, all known Yuman pottery was fired in an oxidizing atmosphere. To suppose that the Havasupai manufactured clay vessels fired in a reducing atmosphere is to postulate a cultural separation of the Havasupai from all other Yuman-speaking Indians which is not reflected in any other aspect of Havasupai culture.

The difference in time between the known occupation of the plateau by the Cohonina and the Havasupai also presents a major obstacle to the acceptance of the hypothesis that these two tribes were related. The San Francisco Mountain Gray Ware made by the Cohonina does not seem to have been made after about A.D. 1150 (McGregor, et al. 1951: 20, 31; Euler and Green 1978: 58). The Havasupai inhabited their Havasu Canyon-Moencopi Wash range by 1776 which Fr. Francisco Garces traversed en route to the pueblo of Oraibi from the lower Colorado River (Coues 1900: 340-356, 407-408). Northeastern Pai lived west of the Hopis, probably in their historic habitat, more than a century earlier, being referred to in 1665 Spanish documents (Schroeder 1953; Euler 1974). This leaves a gap of approximately 500 years between the last known Cohonina occupation and the earliest historically documented Havasupai occupation. Archaeologically, it has been ascertained that the Havasupai entered their historic range about A.D. 1300 or slightly later (Euler and Green 1978; Euler 1981).

Needless to say, a great deal can happen in 150 years. Rogers' (1946) theory of Yuman migration from California, if correct, would have the Havasupai entering their historic habitat during this period from the west as the vanguard of the Yuman advance. In sum, linking of modern Havasupais to the prehistoric Cohonina comes down to the fact that both seem to have occupied the same region at different times. Even McGregor (1951: 134) has said: "It must be admitted that there is no real evidence of Cohonina-Havasupai connection, be-
yond that of geographic location."

While we have now been successful in identifying Walapai and Havasupai pottery, we are not yet able to define Yavapai ceramics with any surety. A primary reason for this is that, with one exception, no definitely identifiable Yavapai sites have been located. Still, several hypotheses for the identity of Yavapai pottery may be offered.

1. Yavapais probably made Tizon Brown Ware or some variant, as indicated by sherds and whole pieces of this ware in late historic Yavapai territory. In 1864, an Anglo-American prospector at a Yavapai camp near the Agua Fria river "saw two ollas of earthenware of the probable capacity of two gallons each sitting near with water in them, and I dismounted and took a drink from one of them . . . The ollas were all the furniture about the camp of any kind. They were spherical and of a reddish cast as if made of poor material, and unpainted or ornamented" (Conner 1956: 160-162). This description certainly indicates an oxidized ware.

Also in support of this hypothesis is a wide-mouthed jar of Cerbat Brown that we have studied (Figure 9). Owned by Lillian B. Satathite, of Yava, Arizona, it was found by her husband more than 50 years ago upside down in an oak grove in the west end of Peeples Valley in Yavapai territory. In the Sharlot Hall Museum is another vessel of Cerbat Brown (Figure 10) reported to have come from Yava in 1928. This specimen is also a wide-mouthed jar with a rounded base and a somewhat flaring shoulder. It almost appears as though the vessel had been begun as a bowl, after which a sharp shoulder was made and the walls tapered up to the rim. The conditions under which recovery was made, however, are unknown.

It should be mentioned here that another jar of unaltered Cerbat Brown (Figure 11) also was located in the Sharlot Hall Museum, but again a provenience is lacking. This vessel is similar in shape to the vessel from Yava, being wide-mouthed, but with a somewhat more globular body.

At a sherd area on Cherry Creek, a tributary of the Verde, 100% of the sherds we collected were Tizon Wiped, as previously described for the Havasupai. We were not able to determine an occupation date for this site.

At several sites south of the Bill Williams Fork-Santa Maria River, including a rock shelter in the Hareuvar Mountains, we have recorded sherds of Tizon Brown Ware. We should note, however, that we are not yet convinced that these streams were exclusively held by the Yavapai. Some of our ceramic data point to at least a temporary occupation by riverine Yumans (Halchidhoma), at least as far east as the Santa Maria-Big Sandy junction. At the Hareuvar Mountain site, a portion of a flaring rimmed bowl of Cerbat Brown was found in association with a Parker Red-on-Buff bowl and a Parker Buff narrow-necked jar; while along the Bill Williams to its junction with the Big-Sandy-Santa Maria, not only have Lower Colorado River Buff Ware sherds been recovered, but also ceramic evidence of a "hybrid" of that ware with Tizon Brown Ware.

We (Euler 1958) have excavated a rock shelter on Turkey Creek, south of Prescott, which Gifford's (1936: 356 and Plate 8A) informants said had been occupied by northeastern Yavapai. Unfortunately, some of the midden deposits in this important site had been water disturbed. That, coupled with a very low total sherd sample (22) makes it difficult to interpret the history of the occupation or to unequivocally assign any portion of it to Yavapai. Nevertheless, seven sherds of Tizon Brown Ware were recovered from the shelter.

An excavation of a rock shelter
9. Cerbat Brown jar from Peeples Valley. Height of vessel is 25.0 cm. Scale is graduated in 5 cm. divisions.
10. Cerbat Brown jar, Sharlot Hall Museum, Prescott. Height of vessel is 33.5 cm.
11. Cerbat Brown jar, Sharlot Hall Museum, Prescott. Height of vessel is 30.5 cm.
in Yavapai territory east of the Agua Fria yielded several projectile points identical to those of the Walapai and Havasupai (Euler 1981: 171). In association with them were 21 sherds of Tizon Wiped (Pilles and Katich 1967: 13). Euler examined these sherds and has concurred in this identification. Unfortunately, no vertical provenience was reported, but the authors did indicate that the sherds and points were associated with "a rusted clip-like metal object" apparently indicating a historic context. Pilles and Katich (1967: 28) believed that the Tizon Wiped sherds were the indigenous ceramics of the historic Yavapai and that Yavapai occupation of the site occurred about 1865 to 1875.

In 1976, a site near Kohl's Ranch in the Payson Ranger District of the Tonto National Forest, excavated by Dittert (1976: 19-20) was "thought to be the remains of a Yavapai site." On or near a living surface and storage pit he recovered Tizon Brown Ware sherds. These included 6 Cerbat Brown, 10 Tizon Wiped, and 2 Aquarius Brown.

Schroeder (Personal communication, April, 1957) reported a sherd area (Ariz. 0:13:21) along a trail on the west rim of Bloody Basin in Yavapai territory that yielded 146 sherds of Tizon Wiped, 5 of Wingfield Plain, and 17 unidentified. Euler, who examined the sherds, concurred in this typology. Unfortunately, we do not know the occupation dates of the site.

2. Schroeder (1954: 103-107) also has implied that Wingfield Plain may represent aboriginal Western Yavapai pottery. We feel that this hypothesis may be rejected, however, on the grounds that sherds of that Hohokam type have been found solely in a prehistoric context, although within later Yavapai territory, from the Bradshaw Mountains to Organ Pipe Cactus National Monument.

3. The hypothesis might be entertained that the Yavapai made Prescott Gray Ware, solely on the basis of territorial coincidence. Again, because this ware has not been found to exist post-A.D. 1300, and because it is basically a reduced ware, we reject this postulate.

4. Possibly different bands of Yavapais produced two or more wares and/or types. We have already reviewed the multiplicity of types such as Cerbat Brown, Aquarius Brown, and Tizon Wiped which are possibilities.

5. Finally, perhaps the Yavapai made an as yet unidentified ceramic ware. At Turkey Creek cave we recovered several blackish-brownish sherds which may have been Yavapai; however, we were unable to make positive identifications. In addition, Breternitz (1960: 28 and Figure 3) excavated a rock shelter along Ash Creek from which he described sherds thinned by the paddle-and-anvil technique, fired in an uncontrolled atmosphere, with a surface color of black to brown. The exteriors appear to be slightly corrugated although they were described as "roughened and/or indented with intervening scraping." These he called Orme Ranch Plain and tentatively attributed them to the historic Northeastern Yavapai.

In summation, Walapai and Havasupai ceramics are both Tizon Brown Ware, distinguished only by a difference in surface treatment. Yavapai pottery may have been Tizon Brown Ware also, perhaps with minor differences, but this cannot as yet be stated with certainty.

Arizona State University and Grand Canyon, Arizona and Center for the History of the American Indian, The Newberry Library
NOTES

1 We are indebted to Albert H. Schroeder for his assistance early in our research in identifying prehistoric ceramic types from the so-called Patayan, now Hakataya, area of northwestern Arizona. This paper is a tribute to his aid.

2 This and all following references to native informants are from field notes in the authors' possession.

3 All sites referred to in the Arizona quadrangle system are recorded at the Arizona State Museum and collections are maintained there. Similarly, all sites designated with NA numbers are recorded at the Museum of Northern Arizona.

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Sitgreaves, Lorenzo

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U.S. Senate

Wheeler, George M.
INTRODUCTION

In the mid 1800s, William P. Blake, geologist and anthropologist, noted that the Navajo Indians of northwestern New Mexico wore ornaments fashioned of a green stone that they called chalchihuitl. Suspecting that the stone might be turquoise and learning that it was obtained by Pueblo Indians from the mountains about 20 miles south of Santa Fe, Blake visited the conical peaks known as Los Cerrillos. There he discovered extensive quarry excavations that had large pine trees growing within them. Sherds from Indian pottery and numerous fragments of apple-green to blue-green minerals among the lichen-covered rocks suggested to Blake that the mining had been carried out prior to the settlement of the area by the Spanish. Blake also noted that Indians from a pueblo on the Rio Grande still visited the locality to collect turquoise by breaking rocks that had been quarried during earlier mining activities (Blake 1858).

During the years since Blake's discovery of the turquoise mines at Cerrillos, numerous other turquoise sources have been described in the Southwestern United States (Mathien 1981a:Appendix C). None of these, however, match Cerrillos in size of prehistoric or early historic excavation. Measurements of these workings were recorded by Blake (1858), Silliman (1881), and Sterrett (1911). In addition to potsherds, numerous stone tools have been found at prehistoric mines. At Mount Chalchihuitl, hafted hammers and sledges weighing up to 20 pounds were described by Silliman (1881).

Modern turquoise mining operations began in the Cerrillos district around 1881 (Silliman 1881) and have continued intermittently throughout the past century. A number of turquoise claims have been documented by Arrowsmith (1974) and Pogue (1974 [1915]: 53). These have been summarized in Table 1. Evidence of the prospectors' activities were found at every vein outcrop and turquoise pit. Broken bottle glass, rusty tin cans, machine-tooled square nails, and former tent sites revealed recent use. The dumps of the prospect pits and shafts were quite fresh, showing little weathering and less vegetation in contrast to the lichen-covered rocks at old Indian mines and Spanish shafts. In addition to turquoise, prehistoric and historic people have mined lead ore, copper, and iron minerals from the Cerrillos district (Warren 1976).

While it is important to document the use of the Cerrillos district for historical purposes, one must understand its prehistoric use as well. Because of the size of the prehistoric turquoise workings and the location of Cerrillos in northern New Mexico, numerous archaeologists have suggested that turquoise artifacts from archaeological sites probably came from the Cerrillos district, especially those in Chaco Canyon where the largest numbers have been found (e.g., Judd 1954). Others have suggested that turquoise from this area also played a prominent role in long-distance trade networks extending into Mexico (Weigand et al. 1977).

In order to examine the role of turquoise mining in prehistory, a study...
of the turquoise mines of the Cerrillos district was carried out during the past decade. Particular emphasis has been placed on the study of the ceramics associated with the turquoise mines and workshops in order to establish periods of mining and cultural affinities of the miners through time and space.

Table 1
Historic Turquoise Mines in the Cerrillos District
(Based on Arrowsmith [1974] and Pogue [1974/1915])

Mount Chalchihuitl
previously used in 1680 and 1763
explored by J.B. Hyde in 1881
numerous claims during past century

Turquoise Mountain
a. Castilian Mine: opened 1879
The Palmerly claim was staked in 1885
The Muniz claim in 1889
The American Turquoise Co. took over these claims in 1892, as well as the Tiffany Mine that is one-half mile to the east.
Other claims in this area include Blue Bell, Consol Mahoney, Morning Star, Sky Blue, and Gem.
b. J.P. McNulty claim was staked in 1892-1904.

Michael O'Neil claim

A.B. Renehan claim

PHYSICAL SETTING OF THE CERRILLOS DISTRICT

The Cerrillos district encompasses about 30 square miles. Included in it are several cone-shaped peaks with elevations between 6900 and 7000 feet (Figure 1). Vegetation is sparse throughout the area, consisting mainly of juniper and grasses. There is a spring near the Mina del Tiro Arroyo, and another spring flow is stored at the Cerrillos Reservoir. Los Cerrillos, the "little hills," were formed 30 to 40 million years ago when a monzonitic stock intruded into older sedimentary strata. Following the intrusion of the stock was a period of mineralization, generally in the fractures in the monzonite. Erosion subsequently stripped the overlying rocks and exposed mineral veins. According to Disbrow and Stoll (1957), one group of veins strikes nearly north; another group averages N 35° E. While some veins may be traced for a few hundred feet, others extend over 2,500 feet; these are vertical or nearly so. Widths of veins range from one to six feet; the vein material is often brecciated or altered and appears to be much softer than the enclosing monzonitic rock. Archaeological excavations in lead veins have revealed that ore shoots often widen or pinch out vertically as well as laterally.

The monzonitic parent rock at the turquoise deposits is considerably altered and sericitized and gives the appearance of being a soft, earthy white rock; but it is not as easily broken as one might expect. On weathered surfaces, the white rock takes on a limonitic stain. Turquoise occurs in the matrix as seams and veins and occasionally as nodules. The deposits themselves are massive and irregular in form and may cover several acres of surface.

ARCHAEOLOGY OF THE CERRILLOS AREA

Following the discovery of turquoise mines in 1858 by Blake, there was considerable mining in the district; and by 1900, one hundred lodes were being worked. In 1880, Hayward reported that about 50 different Spanish mines had been discovered and located. Because these workings contained stone hammers, sledges, and pottery fragments, it was believed that the
Figure 1. Map of the Cerrillos Mining District.
Pueblo Indians had mined the area at the direction of the Spanish (Jones 1904). Very little archaeological interest developed until recently (Schroeder 1979).

In 1970 archaeological evidence for 17th century Spanish lead mining and smelting activities at Mina del Tiro was discovered by George O. Bachman, geologist with the U.S. Geological Survey in Denver. A survey undertaken by Warren in 1974 in Sections 7 and 8, T14N, R8E, resulted in identifying 12 lode mines worked by the Pueblos (glaze decorated sherds, galena "dust," fragments of lead, hearths, stone tools) and three by the Spanish. The latter included several small smelters with associated fragments of lead ore, crucibles with lead residue, comales, and other artifacts used in mining (Warren 1976).

During the past decade, archaeological excavations were conducted at two prehistoric lead mines, Mina del Tiro (Hawkeye shaft) and Bethsheba, and at the stratified 17th century mine and smelter deposit at Mina del Tiro. The Albuquerque Archaeological Society, under the direction of Richard Bice and William Sundt, worked on the prehistoric mine at the Bethsheba vein, while other volunteers under the direction of Warren excavated at the Mina del Tiro sites (Grigg and Sundt 1975). Since that time, Warren and Mathien have continued to survey and document prehistoric and historic use of turquoise in the district.

Artifact collectors had been active in the Cerrillos district for more than 100 years, and much artifactual material had already been removed from the area. The collection owned by P. L. Schmidt that was once housed in the old red brick house near the Cash Entry mine was offered for sale after his death. The authors do not know of its present location or even if the collection is still intact. It is probably somewhere outside of New Mexico. A limited number of artifacts were collected and sent to the Smithsonian Institution in 1880 (Stevenson 1883).

This paper presents information gathered during recent field surveys by Warren and Mathien at prehistoric turquoise mines in the Cerrillos district. Dating of specific mining areas using ceramic evidence is provided, and implications of these results are discussed.

METHODS

Survey

Fieldwork commenced in 1977 and continued through 1983. The primary purpose of the archaeological survey was to find and locate all turquoise mining areas and related sites. Collection of artifacts for analyses was also an objective. Artifacts included such items as stone mining tools, lapidary tools, pottery, glass, and square nails. Mine shafts, dumps, refining areas, backfill in prehistoric mines, campsites, hearths, stone foundations, and old roads and trails were noted on maps and in field journals. Any pertinent information pertaining to period of mining or operation, multiple use, or possible extent or nature of mining activities was recorded. Notes and sketch maps were made in the field and later documented on standard Museum of New Mexico forms. Numerous photographs were taken in the field and of the artifacts. The Museum of New Mexico serves as a repository for records and artifacts.

Ceramic Analyses for the Cerrillos Mining District

Established pottery classifications of the Rio Grande and adjoining areas were used to name and date the sherds from the turquoise mines. These pottery types were defined or described during the past 50 years by various Southwestern archaeologists including Mera (1933, 1935), Kidder (1931, 1936), Roberts (1931), Hawley...
The periods of manufacture of the various types have been based primarily upon the tree-ring dates summarized by Mera (1940) and Breternitz (1966) and subsequent chronometric dates.

The tempering materials of the prehistoric and historic pottery from the turquoise mines were examined with a stereoscopic microscope. The temper inclusions in potsherds from both prehistoric and historic sites in the upper Middle Rio Grande Valley have been under study petrographically for the past 50 years, and many of the pueblos where certain types of crushed rock temper were used have been identified (Shepard 1936, 1942; Warren 1968, 1974). The source area information obtained during previous petrographic studies has been applied to the sherd assemblages found at the mines. In hope of overcoming the problem of pottery designs persisting for long periods of time, potsherds from Cerrillos were examined for temper inclusions which tend to vary independently of design motifs. The reverse situation may also occur as in the case of Rio Grande glazewares in which style may vary when temper does not.

The problems of ceramic typology have long been recognized and frequently discussed. While establishing some new pottery types in the eastern Red Mesa Valley, Hargrave (1963) emphasized the importance of recognizing and defining ceramic differences with accuracy in order to reflect "minimum time ranges." He pointed out that a style of design was of little use in correlative dating and suggested that a pottery type should refer to a group of ceramic vessels having in common a definite combination of characteristics that refer only to that type. A problem in ceramic typology was encountered during analysis of sherds from the Cerrillos mines. It involved identification of mineral-paint pottery.

The four northwestern New Mexico types: Kiatuthlanna Black-on-white, Red Mesa Black-on-white, Escavada Black-on-white, and Gallup Black-on-white, have been believed to be of different consecutive time periods ranging from A.D. 720 to 1200. In the Middle and Upper Rio Grande, the four types appear to be more or less contemporary, occurring on sites ranging in time from about A.D. 1000 to 1150.

The Rio Grande sites included LA 835, a group of 12 to 15 house groups at Cuyamungue in the Tesuque Valley, a site believed to have been occupied "during the 1000s, and possibly as late as 1150 A.D." (Stubbs 1954). Tree-ring dates from the site "appear to represent occupation from the early 11th century until the early 12th century" (Robinson et al. 1972). The ceramic assemblage at the site included the intrusive Kiatuthlanna Black-on-white, Red Mesa Black-on-white, Escavada Black-on-white (or Grants Black-on-white), and Gallup Black-on-white (Prewitt Black-on-white) sherds. Local counterparts of the latter two types, Kwahe'e Black-on-white (Escavada Black-on-white) and Taos Black-on-white (Gallup Black-on-white), were also present at Cuyamungue, although 73 percent of the sherds examined from the site contained the clay plates and temper characteristic of eastern Red Mesa Valley.

Similar pottery types and temper occurred at the Toribio site (LA 9193) at Zia and the Tsogue site (LA 746) near Tesuque. Radiocarbon dates obtained at the Toribio site at Zia were A.D. 1041±150 and 1135±35 (Allen 1973).

At Casamero Ruin, LA 8779, located in the eastern Red Mesa Valley north of Prewitt, New Mexico, Neller (1978) dated the pottery of that site between A.D. 1050 to 1150. Similar dates were assigned to the Casamero community by Marshall et al. (1979).
and Powers et al. (1983). Temper and pottery types were similar to the early mineral-paint wares of the Prewitt series in the eastern Red Mesa Valley and to the early mineral-paint wares of the Cuyamungue, Toribio, Tsogue, and Cerrillos turquoise sites. Based on the above cited evidence, it was decided to date both Kiatuthlanna Black-on-white and Gallup Black-on-white to approximately A.D. 1000-1150 during the analysis of sherds collected at the Cerrillos mines. This does not preclude the possibility that it might have been earlier in this area, but it seems reasonable that it could just as well fall into this later time frame.

RESULTS

In the past, the barren hills of the Cerrillos district did not attract permanent prehistoric Anasazi settlements. San Marcos is a large glaze period (Pueblo IV) village located along New Mexico Highway 14 about two miles east of the Cerrillos district. One of the historic pueblos of the Galisteo Basin, San Marcos was occupied between 1350 and 1680 (Reed 1954). Other smaller sites, possibly farmhouses, were found along San Marcos Arroyo and the Galisteo Creek. No other houses or any evidence of permanent Pueblo/Anasazi residences were found within the survey area.

Archaeological sites associated with the Anasazi/Puebloan mining activities in the Cerrillos district included turquoise pits, quarries, stopes and tunnels, workshops, hearths, campsites, and sherd areas. Several major turquoise mining areas were defined (Figure 1). Mount Chalchihuitl (LA 5027, M-2) is best known, but others have been worked prehistorically as well as during the past century. These include the ridge west of Mina del Tiro (LA 5028, M-3, M-64), the O'Neil turquoise mines (LA 5029, M-4), and the Bonito turquoise quarries (M-61) on the hills south of Franklin Ridge, as well as two small turquoise pits (M-34) on the east side of Franklin Ridge. Additional evidence for turquoise mining was found at Grand Central (M-71), Mount McKenzie (M-72), Firefly (M-55), and Turquoise Hill (M-90).

Description of the Mining Areas Examined

Mount Chalchihuitl. The turquoise mines of Mount Chalchihuitl were worked extensively in prehistoric time by Pueblo Indians. Blake (1858) reported that there was no evidence of recent mining, but that Indians, in order to obtain turquoise, occasionally visited nearby pits and broke up large previously mined rocks. In 1881, D. C. Hyde had plans to sink three exploratory shafts in Mount Chalchihuitl and had begun some of this work (Silliman 1881), but the exploration proved unsuccessful (Pogue 1974(1915)). Evidence of prehistoric use, including quarries, underground mines, mining debris, and camp or workshop areas, covered about 20 acres (Figure 2). Sterrett (1912) disagreed with an earlier estimate by Silliman (1881) stating that the area was only 2 1/2 acres; however, the latter referred only to the large pit on the west side of the hill. The depth of the debris from that pit was recently measured at 3 meters where dissected by an arroyo. Sterrett (1912) measured the west pit at 200 feet across the rim; 100 feet across the bottom; 130 feet deep at the upper side, and 35 feet deep on the lower side.

The rock forming the one hundred foot high hill of Mount Chalchihuitl has been described as a brecciated volcanic vent of the fourth volcanic stage of the Espinaso Volcanics; the rocks were reported as being "intensely argillized and silicified" (Gustafson 1965). Turquoise occurred in various shades from blue to bluish
Figure 2. Map of the Mount Chalchihuitl Turquoise Mines.
green to green as veins, nodules, and encrustations.

Ceramics of Mount Chalchihuitl. The 145 sherds that have been collected at Mount Chalchihuitl by a number of individuals over a period of about 10 years dated between A.D. 1000-1150 and A.D. 1700 (Table 2). It has been possible to assign about two-thirds of these to provenience areas: north, south and west tailings slopes; east crest and slopes; west crest; and general surface.

The oldest pottery found at Mount Chalchihuitl was assigned to an early Pueblo III period mainly on the basis of the corrugated wares present. The sherds came from the crest of Mount Chalchihuitl and were associated with a possible workshop. Utility wares included corrugated indented oblique sherds and one with narrow bands and wide scallops. The decorated sherds had Dogozshi-style mineral paint designs with narrow framing lines. Surfaces were slipped and often crackled. Sherd pastes were dark gray to nearly black with coarse-grained, rounded, clear quartz grains and white siltstone fragments, a temper type noted in the eastern Red Mesa Valley. At least two sherds had pearly mica inclusions in a white slip, a characteristic apparently unique to the San Mateo-Grants area in the eastern Red Mesa Valley.

The decorated Dogozshi style sherds can best be assigned to Gallup Black-on-white, herein a synonym for Prewitt Black-on-white (Hargrave 1963).

Two sherds of Galisteo Black-on-white with San Marcos latite temper were found on the west slope of Mount Chalchihuitl. These were assigned to late Pueblo III, probably between A.D.

Table 2
Ceramics from Mount Chalchihuitl

<table>
<thead>
<tr>
<th>Ceramics</th>
<th>No. of Specimens</th>
<th>Dating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallup (Prewitt) Black-on-white</td>
<td>10</td>
<td>1000-1150</td>
</tr>
<tr>
<td>Mineral-on-white</td>
<td>13</td>
<td>?</td>
</tr>
<tr>
<td>Galisteo Black-on-white</td>
<td>2</td>
<td>1250-1350</td>
</tr>
<tr>
<td>Carbon-on-white</td>
<td>2</td>
<td>1200-1350</td>
</tr>
<tr>
<td>Corrugated-Indented (Tusayan)</td>
<td>7</td>
<td>1050-1350</td>
</tr>
<tr>
<td>Corrugated-Indented (Patterned)</td>
<td>3</td>
<td>1050-1350</td>
</tr>
<tr>
<td>Corrugated-Indented (Oblique)</td>
<td>5</td>
<td>1050-1350</td>
</tr>
<tr>
<td>Corrugated, clapboard</td>
<td>3</td>
<td>1050-1350</td>
</tr>
<tr>
<td>Plainware, utility</td>
<td></td>
<td>1050-1350</td>
</tr>
<tr>
<td>Cieneguilla Glaze-polychrome</td>
<td>6</td>
<td>1350-1425</td>
</tr>
<tr>
<td>Largo Glaze-polychrome</td>
<td>3</td>
<td>1400-1450</td>
</tr>
<tr>
<td>Espinoso Glaze-polychrome</td>
<td>2</td>
<td>1425-1490</td>
</tr>
<tr>
<td>Intermediate Glaze-polychrome</td>
<td>1</td>
<td>1425-1600</td>
</tr>
<tr>
<td>Puaray Glaze-polychrome</td>
<td>1</td>
<td>1515-1600</td>
</tr>
<tr>
<td>Puaray Glaze-polychrome, &quot;M&quot; rim</td>
<td>1</td>
<td>1600-1650</td>
</tr>
<tr>
<td>Kotyiti Glaze-polychrome</td>
<td>4</td>
<td>1650-1700</td>
</tr>
<tr>
<td>Glaze body, late</td>
<td>4</td>
<td>1600-1680</td>
</tr>
<tr>
<td>Glaze body, miscellaneous</td>
<td>69</td>
<td>1350-1600</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>145</strong></td>
<td></td>
</tr>
</tbody>
</table>
1250 and 1350.

Glaze-paint wares of all time periods were present, except those made ca. A.D. 1500, with most of the sherds being tempered with San Marcos latite.

Artifacts of the late Historic or Territorial period of mining at Mount Chalchihuitl included an abundance of tin cans, bottle glass, remnants of mining equipment, and chinaware. Concentrations were found on the southeastern and eastern footslopes of the hill.

Mina del Tiro. A group of turquoise quarries were located about 210 meters northwest of the historic lead mines of Mina del Tiro. The turquoise mines were worked by the Pueblo Indians between A.D. 1050 and 1500, while the nearby lead veins were worked between A.D. 1300 to about 1500. No historic turquoise mining has been reported in the literature, but the conditions of the workings when originally surveyed in 1974 indicated turquoise mining in the early 1900s.

The prehistoric turquoise mines (Figure 3) included numerous pits, camps, and workshops; a 20th century pit had a depth of 3 to 4 meters. This and other pits had been filled in. Dimensions of the mining area were about 150 x 150 meters; however, workshops were found as far as 180 meters to the east and south.

The turquoise quarries were located on a flat-topped ridge trending north-south and on the steep slopes of the ridge. Quarries also were recorded on an adjoining ridge to the west. This area has recently been disturbed by road-building activities. The turquoise occurred as veins and nodules in altered monzonite.

Ceramics of the Mina del Tiro turquoise mines. Although the sherds from the turquoise pits and workshops west of Mina del Tiro were few in number (total 52, Table 3), at least two periods of activity were indicated. Mineral painted sherds from Workshop #3, on the east slope below the turquoise pits, and the ridge above Workshop #2, were tentatively classified as Gallup (Prewitt) Black-on-white. One of these strongly resembled the cribbed style found on Cortez Black-on-white (Hayes and Lancaster 1975: 125, Figure 135); however, from temper inclusions, it is believed to have been produced in the same area as the other mineral paint sherds, in the eastern Red Mesa Valley. If so, the assemblage probably dates to the same period as the mineral painted sherds at Mount Chalchihuitl, ca. A.D. 1050–1125, or later.

Glaze-paint sherds from Mina del Tiro all dated to the early and intermediate glaze periods, between A.D. 1350 to 1500. Six of the 12 glaze-paint sherds were tempered with hornblende latite of the Tonque Pueblo, while the balance were from San Marcos Pueblo.

The utility wares appeared to have been associated mainly with the early components of the site and included plain brown and gray ware, corrugated indented, corrugated indented smeared, and Tesuque Micaceous. One plain utility sherd contained temper similar to that in the Gallup (Prewitt) Black-on-white sherds.

O'Neil Turquoise Mines. As designated herein, the O'Neil turquoise mines were located along the southwestern footslopes of Franklin Ridge. O'Neil held the patent on the land in the entire north half of Sec. 8, T14N, R8E, and may have also mined turquoise in the quarries east of the workings described herein. These included the Bonito and the Blue Jay turquoise pits (see below). O'Neil worked the turquoise mines during the first two decades of the 20th century.

Ancient workings and prospecting for silver have left numerous openings along this turquoise lead . . . About a dozen shafts and a large number of prospect pits and cuts
MAP OF THE MINA DEL TIRO TURQUOISE MINES

SS        Sherd Scatter
        Sherd
        Lithic flaked stone
        Turquoise Pit
        Artifact Concentration

Contour interval 2 m

Figure 3. Map of the Mina del Tiro Turquoise Mines.
had been made over a belt of country about 250 feet wide. Some of the shafts were 40 to 50 feet deep and around them were open cuts. At one of these a track for a mine car had been laid through the cut to a platform over the shaft to expedite the removal of rock. The turquoise is associated with decomposed rock quite similar in appearance to that on Mt. Chalchihuitl (Sterrett 1912: 1069).

All the workings were on the southwest and northeast facing slopes of a long flat-topped ridge. Figure 4 shows the quarry pits and campsites designated as Feature 8. In 1974, the turquoise quarries on the northern end of the ridge were disturbed by bulldozers. Prehistoric workings were extensive to the south, however, and included workshop areas as well as quarries. The 20th century workings could be distinguished from the prehistoric by absence of lichen on the large rocks on the tailings.

Ceramics of the Michael O'Neil turquoise mines. Sherds present at a number of localities indicated that prehistoric mining was continuous from about A.D. 1050 to 1500 or 1550, with brief historic period use by Pueblo Indians between A.D. 1650-1680 in Feature 8 (Table 4).

Feature 1 was a small turquoise pit on the northeast end of the ridge. A worked sherd of Potsuwi'i Gray, an unslipped plainware with vitric tuff temper, and an unidentified polished gray sherd (Mesa Verde Black-on-white?) with medium-grained sandstone temper were the only sherd recovered.

Feature 2, on a small ridge immediately south of Feature 1, was probably worked in the late 1300s-early 1400s. Sherds of Cieneguilla Glaze-on-yellow and Bandelier Black-on-gray were present.

Feature 3 dated to approximately the same period as Feature 2. Sherds of Cieneguilla Glaze-on-yellow and
Figure 4. Map of the O'Neil Turquoise Mines.
<table>
<thead>
<tr>
<th>Ceramic Type</th>
<th>No. of Specimens</th>
<th>Dating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Surface, general</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kwahe'e Black-on-white</td>
<td>1</td>
<td>1050-1225</td>
</tr>
<tr>
<td>Cieneguilla Glaze-polychrome</td>
<td>1</td>
<td>1350-1425</td>
</tr>
<tr>
<td>Espinoso Glaze-polychrome</td>
<td>1</td>
<td>1425-1490</td>
</tr>
<tr>
<td>Intermediate Glaze-polychrome</td>
<td>1</td>
<td>1425-1600</td>
</tr>
<tr>
<td>Glaze-on-red</td>
<td>10</td>
<td>1350-1600</td>
</tr>
<tr>
<td>Glaze-on-yellow</td>
<td>10</td>
<td>1350-1600</td>
</tr>
<tr>
<td>Glaze-polychrome</td>
<td>2</td>
<td>1350-1600</td>
</tr>
<tr>
<td>Brownware (Jornada?)</td>
<td>1</td>
<td>1100-1400</td>
</tr>
<tr>
<td>Brownware, Smudged, Polished</td>
<td>2</td>
<td>1100-1400</td>
</tr>
<tr>
<td>Corona Plain</td>
<td>1</td>
<td>1450-1700</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>30</td>
<td></td>
</tr>
<tr>
<td><strong>Feature 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potsuwii'i Gray</td>
<td>1</td>
<td>1550-1600?</td>
</tr>
<tr>
<td>Mesa Verde Black-on-white?</td>
<td>1</td>
<td>1150-1300</td>
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<tr>
<td><strong>Sub-total</strong></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td><strong>Feature 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glaze-pink</td>
<td>1</td>
<td>1350-1550?</td>
</tr>
<tr>
<td>Glaze-yellow</td>
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<td></td>
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<tr>
<td>Glaze-polychrome</td>
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<td></td>
</tr>
<tr>
<td>Redware</td>
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</tr>
<tr>
<td>Cieneguilla Glaze-polychrome</td>
<td>1</td>
<td>1350-1425</td>
</tr>
<tr>
<td>Bandelier Black-on-gray (Biscuit B)</td>
<td>1</td>
<td>1425-1550</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>27</td>
<td></td>
</tr>
<tr>
<td><strong>Feature 3</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cieneguilla Glaze-on-yellow</td>
<td>3</td>
<td>1350-1425</td>
</tr>
<tr>
<td>Glaze-on-yellow</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Carnue Plain</td>
<td>25</td>
<td>1700-1900</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>33</td>
<td></td>
</tr>
<tr>
<td><strong>Feature 5</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Redware, glaze</td>
<td>1</td>
<td>1325-1700</td>
</tr>
<tr>
<td><strong>Feature 6</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glaze-on-red</td>
<td>11</td>
<td>1350-1600?</td>
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<tr>
<td>Glaze-on-yellow</td>
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<td>Glaze-polychrome</td>
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<td><strong>Sub-total</strong></td>
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<tr>
<td><strong>Feature 7</strong></td>
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</tr>
<tr>
<td>Santa Fe Black-on-white?</td>
<td>1</td>
<td>1200-1300</td>
</tr>
<tr>
<td>Cieneguilla Glaze-on-yellow</td>
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<td>1350-1425</td>
</tr>
<tr>
<td>Largo Glaze-on-yellow</td>
<td>1</td>
<td>1400-1450</td>
</tr>
<tr>
<td>Ceramic Type</td>
<td>No. of Specimens</td>
<td>Dating</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>------------------</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>Feature 7 (Continued)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Espinoso Glaze-polychrome</td>
<td>2</td>
<td>1425-1490</td>
</tr>
<tr>
<td>Glaze-polychrome</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Royal ironstone</td>
<td>1</td>
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</tr>
<tr>
<td>Sub-total</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td><strong>Feature 8</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whiteware, Pueblo III</td>
<td>1</td>
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</tr>
<tr>
<td>Santa Fe Black-on-white</td>
<td>1</td>
<td>1200-1300</td>
</tr>
<tr>
<td>Carbon-on-white</td>
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<td></td>
</tr>
<tr>
<td>Abiquiu Black-on-gray (Biscuit A)</td>
<td>4</td>
<td>1350-1450</td>
</tr>
<tr>
<td>Bandelier Black-on-gray (Biscuit B)</td>
<td>3</td>
<td>1425-1550</td>
</tr>
<tr>
<td>Biscuitware</td>
<td>1</td>
<td>1350-1550</td>
</tr>
<tr>
<td>Creamware</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Espinoso Glaze-polychrome</td>
<td>4</td>
<td>1425-1490</td>
</tr>
<tr>
<td>San Lazaro Glaze-polychrome</td>
<td>1</td>
<td>1490-1515</td>
</tr>
<tr>
<td>Puaray Glaze-polychrome</td>
<td>1</td>
<td>1515-1600</td>
</tr>
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<td>Intermediate Glaze-polychrome</td>
<td>3</td>
<td>1350-1525</td>
</tr>
<tr>
<td>Kuaaua Glaze-polychrome</td>
<td>1</td>
<td>1400-1550?</td>
</tr>
<tr>
<td>Kotyiti Glaze-polychrome</td>
<td>3</td>
<td>1650-1700</td>
</tr>
<tr>
<td>Pecos Glaze-polychrome</td>
<td>1</td>
<td>1600-1700</td>
</tr>
<tr>
<td>Glazeware, body sherds</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>Corrugated Indented Oblique (Mancos)</td>
<td>5</td>
<td>1050-1350</td>
</tr>
<tr>
<td>Corrugated Indented Oblique Smeared</td>
<td>1</td>
<td>1050-1350</td>
</tr>
<tr>
<td>Corrugated Indented Oblique Micaceous</td>
<td>1</td>
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</tr>
<tr>
<td>Jornada Brown</td>
<td>1</td>
<td>1100-1400</td>
</tr>
<tr>
<td>Corona Plain</td>
<td>2</td>
<td>1450-1700</td>
</tr>
<tr>
<td>Sub-total</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td><strong>Feature 12</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wiyo Black-on-gray</td>
<td>1</td>
<td>1300-1400</td>
</tr>
<tr>
<td>Abiquiu Black-on-gray</td>
<td>1</td>
<td>1350-1450</td>
</tr>
<tr>
<td>Glazeware, body sherds</td>
<td>3</td>
<td>1350-1450</td>
</tr>
<tr>
<td>Sub-total</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>Feature 13</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bandelier Black-on-gray</td>
<td>2</td>
<td>1425-1550</td>
</tr>
<tr>
<td>Glaze-on-white</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Sub-total</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Feature 14</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Largo Glaze-polychrome</td>
<td>1</td>
<td>1400-1450</td>
</tr>
<tr>
<td><strong>Feature 15</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glaze-on-yellow (Tonque G)</td>
<td>1</td>
<td>1350-1525</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>249</td>
<td></td>
</tr>
</tbody>
</table>
body sherds of glaze-on-yellow from San Marcos were present. Fragments of a vessel of Carnue Plain were located on the footslope of the ridge, indicating some activity in the area during the historic period between A.D. 1700 to 1880. Carnue Plain was described by Dick (1968: 84-85) as being a common pottery type at Spanish sites throughout New Mexico.

Feature 5 produced only one red sherd of a glazeware jar with San Marcos latite temper. This could date anywhere between A.D. 1325 to 1700, but a post-1550 date is most likely, as redwares were rarely made at San Marcos Pueblo before then.

Feature 6 consisted of west-facing prehistoric turquoise pits directly across the ridge from Feature 1. Pottery included glaze-paint body sherds with San Marcos and Tonque latite temper and at least one vessel from the Cochiti area with red scoria temper. An early to middle glaze period is suggested, ca. A.D. 1350 to 1600.

Nineteen Puebloan sherds were found at Feature 7 which was located on the ridge southwest of Feature 6. A Pueblo III, Santa Fe Black-on-white, as well as a number of Pueblo IV sherds were recovered. These included two intermediate glaze-paint sherds (Espinoso Glaze-on-polychrome) from San Marcos, a Cieneguilla Glaze-on-yellow, a Largo Glaze-on-yellow, and 14 glaze-polychrome sherds. There was also one historic sherd, a Royal ironstone plate fragment. The glaze period extended from A.D. 1350 to 1490. The Santa Fe sherd dated ca. A.D. 1200 to 1300; and the Royal ironstone was post 1800.

Feature 8, southwest of Feature 7, had potsherds from three time periods: 1) intermediate glazewares, ca. A.D. 1350 to 1600; 2) late glazewares dating around A.D. 1650 to 1700; and 3) Santa Fe Black-on-white, unidentified carbon paint ware, Tesuque micaeous utility, and Corrugated Indented (oblique), suggesting an earlier mining period between A.D. 1050 to 1350.

Feature 12 was a sherd and lithic scatter located on a small footslope at the southwest end of the mining area. Sherds of Wiyo Black-on-gray, Abiquiu Black-on-gray, and three glaze-paint sherds indicated a date range from A.D. 1300 to 1450. Sherds of a 1425-1550 time range were found at Feature 13, which was located immediately east of Feature 12.

Feature 14, at the southeastern corner of the complex, had one sherd, Largo Glaze-Polychrome, dating A.D. 1400-1450. Feature 15, a workshop on the north slope below Feature 14, produced one sherd of Tonque glaze ware with a date range between A.D. 1350 and 1525.

In summary, prehistoric mining at the Michael O'Neil mines may have been continuous from around A.D. 1050 to about 1700, with a brief historic period at the end of the 17th century.

Franklin Turquoise Pits. Several Pueblo II-III turquoise pits were located about 580 m. SE of Mount Chalchihuitl (Figure 5). Recently, heavy equipment has disturbed the area to the north; this appeared to be related to activities at the Cash Entry lead mine northwest of the turquoise pits.

Three quarries and four workshop camps were recorded in the area. One quarry had crude masonry retaining walls on two sides with a ground level exit to the southwest. The site was about 20 x 25 m. in extent in the mining area; including the workshop and camp areas, it was about 30 x 45 m.

Ceramics of the Franklin turquoise pits. The major mining period at the Franklin turquoise mine appeared to range from around A.D. 1000 to 1150 (Table 5), according to the dates assigned to Kiatauthlanna (of the eastern Red Mesa) Black-on-white in the ceramic discussion above. Since design motifs of the mineral-paint sherds from the Franklin turquoise mines resembled Cortez Black-on-
MAP OF FRANKLIN TURQUOISE MINES

LW  Lapidary Workshop
H   Hearth
LS  Lithic and Sherd Scatter

Contour interval 0.5 m

Figure 5. Map of Franklin Turquoise Mines.
### Table 5
Ceramics from the Franklin Turquoise Pits

<table>
<thead>
<tr>
<th>Ceramic Type</th>
<th>No. of Specimens</th>
<th>Dating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiatuthlanna Black-on-white (E. Red Mesa)</td>
<td>18</td>
<td>1025-1125</td>
</tr>
<tr>
<td>Mineral-on-white, body</td>
<td>1</td>
<td>1025-1125</td>
</tr>
<tr>
<td>Whiteware, body, mineral paint</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Gallup Black-on-white</td>
<td>1</td>
<td>1050-1175</td>
</tr>
<tr>
<td>Carbon-on-white (Chaco-McElmo)</td>
<td>4</td>
<td>1050-1150</td>
</tr>
<tr>
<td>Abiquiu Black-on-gray</td>
<td>1</td>
<td>1350-1450</td>
</tr>
<tr>
<td>Largo Glaze-polychrome</td>
<td>1</td>
<td>1400-1450</td>
</tr>
<tr>
<td>Glazeware, yellow, body</td>
<td>19</td>
<td>1350-1550</td>
</tr>
<tr>
<td>Glazeware, red, body</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Grayware (Lino Gray?)</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Grayware, lug</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Grayware, punctate</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Grayware, neckbanded</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Corrugated, clapboard</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Tesuque Smeared Indented</td>
<td>1</td>
<td>1050-1350</td>
</tr>
<tr>
<td>Corrugated Smeared</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Brownware, plain</td>
<td>2</td>
<td>500-1400</td>
</tr>
<tr>
<td>TOTAL</td>
<td>104</td>
<td></td>
</tr>
</tbody>
</table>

White and/or Kiatuthlanna Black-on-white more than they did Red Mesa Black-on-white, the later dates should hold until other evidence is obtained. Tempering materials of a high percentage of the sherds suggested that they were imported from the eastern Red Mesa Valley.

A second period of mining was indicated by the presence of glazes and one Abiquiu Black-on-gray sherd, with dates between A.D. 1350 and 1450.

Two small turquoise workshop areas of the same time period as the Late Pueblo II-Early Pueblo III sherds were located at this mine.

Bonito Turquoise Mines. The Bonito mines were east of the Michael O’Neil workings and were separated by a deep arroyo (Figure 6). The turquoise pits have been worked prehistorically and during the 20th century. O’Neil worked the mines in the early decades of the century; one shaft could be attributed to this period (Sterrett 1912). Very recent excavations during the past 10 years were confined mainly to reworking dump areas. However, some of the deeper excavations have been filled in.

Prehistorically, the area was extensively mined by Pueblo Indians, mainly from San Marcos Pueblo, between A.D. 1350 to 1700, according to potsherds found in the mines. One slope of unknown extent may date to the prehistoric period. At least five major, separate areas of prehistoric mining were recorded.

Ceramics of the Bonito turquoise mines. The Bonito workings consti-
Figure 6. Map of Bonito Turquoise Mines, Features 1 and 4.
Table 6
Ceramics from the Bonito Turquoise Pits

<table>
<thead>
<tr>
<th>Ceramic Type</th>
<th>No. of Specimens</th>
<th>Dating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Santa Fe Black-on-white</td>
<td>1</td>
<td>1200-1300</td>
</tr>
<tr>
<td>Galisteo Black-on-white</td>
<td>1</td>
<td>1250-1350</td>
</tr>
<tr>
<td>Whiteware</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Corrugated Indented Oblique</td>
<td>1</td>
<td>1050-1350</td>
</tr>
<tr>
<td>Abiquiu Black-on-gray (Biscuit A)</td>
<td>4</td>
<td>1350-1450</td>
</tr>
<tr>
<td>Bandelier Black-on-gray (Biscuit B)</td>
<td>5</td>
<td>1425-1550</td>
</tr>
<tr>
<td>Biscuitware, body sherd</td>
<td>1</td>
<td>1350-1550</td>
</tr>
<tr>
<td>Corrugated Blind Indented</td>
<td>1</td>
<td>1300-1700</td>
</tr>
<tr>
<td>San Clemente Glaze-polychrome</td>
<td>1</td>
<td>1315-1425</td>
</tr>
<tr>
<td>Cieneguilla Glaze-on-yellow</td>
<td>1</td>
<td>1350-1425</td>
</tr>
<tr>
<td>Largo Glaze-on-yellow, Glaze-polychrome</td>
<td>5</td>
<td>1400-1450</td>
</tr>
<tr>
<td>Espinosa Glaze-polychrome</td>
<td>6</td>
<td>1425-1490</td>
</tr>
<tr>
<td>San Lazaro Glaze-polychrome</td>
<td>4</td>
<td>1490-1515</td>
</tr>
<tr>
<td>Puaray Glaze-polychrome</td>
<td>6</td>
<td>1515-1600</td>
</tr>
<tr>
<td>Puaray Glaze-polychrome (&quot;M&quot; rim)</td>
<td>2</td>
<td>1600-1650</td>
</tr>
<tr>
<td>Puaray Glaze-on-red</td>
<td>2</td>
<td>1515-1650</td>
</tr>
<tr>
<td>Kotyiti Glaze-on-red</td>
<td>2</td>
<td>1650-1700</td>
</tr>
<tr>
<td>Glazeware, body</td>
<td>127</td>
<td></td>
</tr>
<tr>
<td>Historic Cochiti redware</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>China, saucer</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>173</strong></td>
<td></td>
</tr>
</tbody>
</table>

Tutted an extensive group of turquoise pits with an area of 62,000 square meters south of Franklin Ridge and east of the Michael O'Neil mines. Sherds were recovered from five of the seven separate pit areas. Of 173 sherds examined (Table 6), all but six were Pueblo IV pottery. One Santa Fe Black-on-white and one Galisteo Black-on-white sherd could be dated to the late Pueblo III period (A.D. 1200-1350). The single Corrugated Indented Oblique sherd overlapped Pueblo II-Pueblo III.

**Blue Jay Turquoise Mines.** The turquoise deposits in the Blue Jay location were worked under a claim registered to Henry Andrews. Extensive bulldozing of the southern part of the location in the 1970s apparently did not produce any important new turquoise deposits. An historic camp dating about A.D. 1900 may have been associated with the nearby turquoise mining; micaceous pottery was found with metal and glass debris dating to the 1880s and 1890s (Wilson: Personal communication). The mines were also worked during Pueblo III and IV time by Pueblo Indians.

The Blue Jay mines covered an area about 100 by 200 m.; numerous prehistoric pits were recorded (Figure 7), one with a depth of 5 m. One adit, 4 to 5 m. long, may have been associated with the 19th century historic camp. The dumps of the prehistoric pits were relatively undisturbed except for one historic prospect related to malachite and azurite deposits. All early workings were located along the footslopes of a flat-topped
MAP OF BLUE JAY TURQUOISE MINES

Turquoise Pit
F Feature (mine area)
Dirt Road

Figure 7. Map of Blue Jay Turquoise Mines.
ridge which separated the Blue Jay from the Bonito quarries.

Ceramics of the Blue Jay Mines. Although one prehistoric turquoise pit which was located on public land was fairly large, extensive bulldozing has recently disturbed most of the area. Ceramics tabulated from the turquoise pits and camp area fell into three different categories (Table 7):

1. Santa Fe Black-on-white (one vessel) at Feature 1.
2. Early to Intermediate Glazeswares (Features 1-3). Cieneguilla Glaze-on-yellow to Espinoso Glaze-polychrome (ca. 1350-1490) from San Marcos Pueblo were the major groups. However, at least one Puaray Glaze-polychrome bowl sherd from Tonque Pueblo dating to the early 1500s was present. A biscuitware sherd (Bandelier Black-on-gray) contained vitric tuff temper, with dark brown to black sherd and indicated that the bowl may have been produced on the southern Pajarito Plateau.
3. A historic camp (Feature 6), possibly dating to the last decades of the 19th century. In addition to two Cieneguilla Glaze-on-yellow sherd, sherd of historic origin were associated with numerous historic artifacts including rectangular nails, sun-colored amethyst glass, barrel parts and tin cans. Sherd of Powhoge Polychrome, containing black vitric tuff sherd possibly from the Cochiti area or the southern Pajarito, Corona Plain slipped(?) and smudged, Corona Plain micaceous, and "Ocate" micaceous were numerous at the historic camp area. Fragments of turquoise were also noted in the camp area.

Firefly Turquoise Mine. The turquoise pit at Firefly was located about 300 m southeast of the Franklin Turquoise pits. The pit, workshop, and camp areas covered an area of about 20 by 35 m (Figure 8).

Ceramics of the Firefly turquoise pit. The relatively small deposits of turquoise at the Firefly mines appeared to have been worked during Late Pueblo II and Pueblo IV. The earlier mining period was contemporary with the mining at the Franklin turquoise pits. Both sites had Late Pueblo II mineral-paint sherds and an early Pueblo IV glaze/yellow sherd assemblage (Table 8). Temper inclusions of the two periods were also similar, although the scarcity of sherds at

<table>
<thead>
<tr>
<th>Ceramic Type</th>
<th>No. of Specimens</th>
<th>Dating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Santa Fe Black-on-white</td>
<td>2</td>
<td>1200-1300</td>
</tr>
<tr>
<td>Bandelier Black-on-gray (Biscuit B)</td>
<td>1</td>
<td>1425-1550</td>
</tr>
<tr>
<td>Cieneguilla Glaze-on-yellow</td>
<td>4</td>
<td>1350-1425</td>
</tr>
<tr>
<td>Espinoso Glaze-polychrome</td>
<td>1</td>
<td>1425-1490</td>
</tr>
<tr>
<td>Puaray Glaze-polychrome</td>
<td>1</td>
<td>1515-1550?</td>
</tr>
<tr>
<td>Glazeware, body</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Corona Plain?</td>
<td>34</td>
<td>1450-1700</td>
</tr>
<tr>
<td>Powhoge Polychrome</td>
<td>1</td>
<td>1760-1900</td>
</tr>
<tr>
<td>&quot;Ocate&quot; Micaceous</td>
<td>1</td>
<td>1700-1900</td>
</tr>
<tr>
<td>TOTAL</td>
<td>69</td>
<td></td>
</tr>
</tbody>
</table>
Figure 8. Map of Firefly Turquoise Mines.
Firefly, in particular, did not allow a final determination.

Grand Central turquoise mines. The turquoise quarries of Grand Central Mountain were located along the foothill ridges and arroyos on the northeastern and northern slopes of the mountain (Figure 9).

In 1911, A.B. Renehan was mining turquoise in this area. Several pits, shafts, and open cuts had been made according to Sterrett (1912), one about 75 ft. long, 3 to 25 ft. deep, and 6 ft. wide. The rock formation was similar to that at Mount Chalchihuital one-half mile to the southeast: turquoise occurring in seams and veinlets in the altered monzonitic rock. During the 1970s extensive mining with heavy equipment had disturbed many of the workings that were scattered along the footslopes for a distance of 600 m. One of the recent cuts had exposed a prehistoric stope or gallery of undetermined extent.

Ceramics at Grand Central. The prehistoric quarries dated primarily to the early to middle glazeware period between A.D. 1350 to 1500, although sherds of one vessel dating between A.D. 1650 to 1700 were noted. Because there were so few sherds, ceramic data will be discussed with that of Mount McKenzie, north of the Grand Central deposits.

Mount McKenzie turquoise mines. The turquoise mines located on the southwestern footslopes of Mount McKenzie consisted of widely scattered quarries, pits, shafts, and prospects over a distance of 600 m. At least three areas had evidence of Pueblo Indian mining, but no potsherds were found. The easternmost pits were prospected during the 1970s with heavy equipment.

The area on the southeastern slopes of Mount McKenzie has not been surveyed in detail. Heavy equipment was used for exploration in the 1970s, and very little turquoise was found. In fact, extensively bulldozed areas appeared to be barren of the mineral. Mathien found one prehistoric open pit with exposed turquoise veins on the north wall. Flaked and ground stone were present. Tin cans, a pail, and other historic artifacts indicated an early 20th century mining period.

Table 8
Ceramics from the Firefly Turquoise Pit

<table>
<thead>
<tr>
<th>Ceramic Type</th>
<th>No. of Specimens</th>
<th>Dating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiatuthlanna</td>
<td>3</td>
<td>1025-1125</td>
</tr>
<tr>
<td>Mineral-on-white</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Galisteo Black-on-white</td>
<td>1</td>
<td>1250-1350</td>
</tr>
<tr>
<td>Grayware, polished</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Grayware, utility</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Grayware, neckbanded</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Corrugated utility</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>San Clemente Glaze-polychrome</td>
<td>1</td>
<td>1315-1425</td>
</tr>
<tr>
<td>Cieneguilla Glaze-on-yellow</td>
<td>1</td>
<td>1350-1425</td>
</tr>
<tr>
<td>Largo Glaze-on-yellow</td>
<td>3</td>
<td>1400-1450</td>
</tr>
<tr>
<td>Glazeware, body</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Corrugated Blind Indented</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>39</td>
<td></td>
</tr>
</tbody>
</table>
Figure 9. Map of Grand Central Turquoise Mines.
Ceramics of Grand Central and Mount McKenzie. These are discussed by specific mining areas; all data are combined in Table 9.

Ceramics at M-71 (Grand Central): These turquoise workings and the ones that follow were located in the foothills of McKenzie Mountain and Grand Central Mountain in the Cerrillos District. Only one diagnostic glaze rim sherd of Espinoso Glaze-polychrome dating A.D. 1325 to 1400 was found. Most of the body sherds contained the San Marcos temper, but sherds with Tonque latite and an unidentified Galisteo Basin source were present.

M-73: Five sherds from this turquoise pit were all tempered with San Marcos latite and probably were from two Glaze A red bowls. This was the only instance of Glaze A red pottery being found at any of the mines. Dates ranged from A.D. 1315 to 1400.

M-74: One sherd of Galisteo Black-on-white with San Marcos latite temper was found at the mine; dates were A.D. 1275 to 1350.

Table 9
Ceramics from the Grand Central and Mount McKenzie Mining Area

<table>
<thead>
<tr>
<th>Ceramic Type</th>
<th>No. of Specimens</th>
<th>Dating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grayware, Lino</td>
<td>1</td>
<td>1050-1350</td>
</tr>
<tr>
<td>Corrugated Indented Sm.</td>
<td>1</td>
<td>1050-1175</td>
</tr>
<tr>
<td>Gallup Black-on-white</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Galisteo Black-on-white</td>
<td>1</td>
<td>1250-1350</td>
</tr>
<tr>
<td>Abiquiu Black-on-gray (Biscuit A)</td>
<td>4</td>
<td>1350-1450</td>
</tr>
<tr>
<td>Whiteware</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Cieneguilla Glaze-polychrome</td>
<td>2</td>
<td>1350-1425</td>
</tr>
<tr>
<td>Buffware</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Largo Glaze-polychrome</td>
<td>1</td>
<td>1400-1450</td>
</tr>
<tr>
<td>Espinoso Glaze-polychrome</td>
<td>2</td>
<td>1425-1490</td>
</tr>
<tr>
<td>San Lazaro Glaze-polychrome</td>
<td>1</td>
<td>1490-1515</td>
</tr>
<tr>
<td>Kotyiti Glaze-on-white</td>
<td>9</td>
<td>1650-1700</td>
</tr>
<tr>
<td>Kotyiti Glaze-on-red</td>
<td>12</td>
<td>1650-1700</td>
</tr>
<tr>
<td>Kotyiti Glaze-polychrome</td>
<td>3</td>
<td>1650-1700</td>
</tr>
<tr>
<td>Glaze-on-yellow/black/white</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Glaze-on-red</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Glaze-polychrome</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Pecos Glaze-polychrome</td>
<td>1</td>
<td>1600-1700</td>
</tr>
<tr>
<td>Ogapoge?</td>
<td>2</td>
<td>1720-1800</td>
</tr>
<tr>
<td>Olive jar</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Porcelain</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Glass</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL 80
M-81: A late 17th century mining period was indicated by one sherd of Glaze F and a body sherd of a Pecos Glaze-polychrome bowl, suggesting mining activity between A.D. 1650 and 1700.

Late Historic or Territorial period mining was indicated by purple glass and porcelain. Several fragments of an olive jar possibly dated to a late Spanish mining period in the 18th or early 19th century.

Turquoise Hill. The four low hills that comprise Turquoise Hill had a number of patented claims that have been owned in recent years by Mrs. Glenn Hughes. Access to the turquoise mines was not obtained by the writers. Major production appeared to have been during the 1880s and 1890s. According to Pogue (1974[1915]: 55), "The total yield from the holdings of the American Turquoise Co., coming chiefly from the 'Tiffany mine' is said to exceed $2,000,000 in value."

Sterrett (1912) reported that the principal turquoise deposits were found in the three lower hills, although some turquoise was found on the northeastern slope of the main hill. The "Tiffany mine" was located in the southeastern hill; the "Castilian mine" was on the westernmost hill. Numerous pits, open cuts, shafts, tunnels, drifts, and stopes dated to the historic period, although some of the quarries' old stopes were reported to be ancient. Although most of the mines had closed before A.D. 1900, Michael O'Neil worked the Blue Bell claim between 1900 and 1925.

A few sherds available from the area indicated mining during Pueblo IV time, between A.D. 1350 and 1600. The Pueblo Indians continued to seek turquoise from Cerrillos into the 20th century. Northrop (1959: 535) quoted a newspaper article in which Indians from Santo Domingo allegedly entered the Tiffany mine at Cerrillos to obtain turquoise. Four Cochitis were sentenced to the State prison in 1911 for a similar episode (Lange 1959: 143).

Ceramics from Turquoise Hill. Although the mines at Turquoise Hill undoubtedly contained extensive prehistoric and territorial mines, permission has not been obtained to examine the area for artifacts.

Of the four sherds available for examination, three were from early to intermediate glaze vessels with San Marcos temper and one was a contemporary Blind Indented Corrugated sherd. Time span is estimated between A.D. 1375 to 1500.

DISCUSSION

Analysis of more than 900 potsherds from nine turquoise mining areas in the Cerrillos district suggested two major periods of prehistoric mining (Table 10). The first was associated with the ceramics of late Pueblo II to early Pueblo III time, dating between A.D. 1000 to 1150 or 1200; the second occurred in Pueblo IV time between A.D. 1350 or 1375 to at least 1680. However, the ceramics varied from one mine to another or within a mining area itself.

Attribute analyses of the potsherds to identify the production sources of the ceramics pointed to affinities (1) with the Tesuque Valley or Upper Rio Grande Valley pottery and eastern Red Mesa Valley during early Pueblo III time, and (2) with San Marcos Pueblo two miles to the east during Pueblo IV time. Small but persistent percentages of biscuitwares from the Pajarito Plateau and glaze-paint wares from Tonque Pueblo near San Felipe were present during Pueblo IV time. Notable for their absence were the Group A glaze-paint redwares, Agua Fria Glaze-on-red; San Clemente sherds were very sparse (one at the Bonito turquoise mines and one at Firefly). The Group A yellow or cream-colored wares, Cieneguilla Glaze-on-yellow and Glaze-polychrome dating between A.D. 1350 and 1425,
### Table 10

**Summary of Ceramics from the Cerrillos Turquoise Mining District**

<table>
<thead>
<tr>
<th>Mining Area</th>
<th>Pre P-III</th>
<th>P-III</th>
<th>Glazewares</th>
<th>Historic/Unknown</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mt. Chalchihuitl</td>
<td>-</td>
<td>54</td>
<td>91</td>
<td>-</td>
<td>145</td>
</tr>
<tr>
<td>Mina del Tiro</td>
<td>-</td>
<td>35</td>
<td>12</td>
<td>5</td>
<td>52</td>
</tr>
<tr>
<td>O'Neil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface</td>
<td>-</td>
<td>4</td>
<td>26</td>
<td>-</td>
<td>30</td>
</tr>
<tr>
<td>Feature 1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Feature 2</td>
<td>-</td>
<td>-</td>
<td>27</td>
<td>-</td>
<td>27</td>
</tr>
<tr>
<td>Feature 3</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>25</td>
<td>33</td>
</tr>
<tr>
<td>Feature 5</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Feature 6</td>
<td>-</td>
<td>-</td>
<td>16</td>
<td>-</td>
<td>16</td>
</tr>
<tr>
<td>Feature 7</td>
<td>-</td>
<td>1</td>
<td>18</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Feature 8</td>
<td>-</td>
<td>11</td>
<td>96</td>
<td>-</td>
<td>107</td>
</tr>
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<td>-</td>
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<td>5</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
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<td>-</td>
<td>-</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Feature 14</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Feature 15</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Franklin</td>
<td>11</td>
<td>62</td>
<td>23</td>
<td>8</td>
<td>104</td>
</tr>
<tr>
<td>Bonito</td>
<td>-</td>
<td>4</td>
<td>167</td>
<td>2</td>
<td>173</td>
</tr>
<tr>
<td>Blue Jay</td>
<td>-</td>
<td>2</td>
<td>65</td>
<td>2</td>
<td>69</td>
</tr>
<tr>
<td>Firefly</td>
<td>-</td>
<td>12</td>
<td>27</td>
<td>-</td>
<td>39</td>
</tr>
<tr>
<td>Grand Central/Mt. McKenzie</td>
<td>2</td>
<td>5</td>
<td>61</td>
<td>12</td>
<td>80</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>13</td>
<td>191</td>
<td>648</td>
<td>59</td>
<td>911</td>
</tr>
<tr>
<td><strong>Percent</strong></td>
<td>1.4</td>
<td>20.9</td>
<td>71.2</td>
<td>6.5</td>
<td>100</td>
</tr>
</tbody>
</table>

**NOTE:** Columns 1 and 2 (Pre P-III and P-III) could be combined. Although the possibility of Lino Gray showing up in the Cerrillos area can be suggested, plain gray utility wares continued to be made throughout P-II and P-III, and into P-IV. Without a rim sherd, Lino Gray cannot be positively identified; even with one, the vessel could be Mummy Lake Gray, a common P-III utility ware in northwestern New Mexico, or even an early P-IV "brownware" made with gray firing clay.
were common at the Cerrillos turquoise mines.

Historic accounts and the presence of occasional sherds of post-Conquest pottery attested to the continued exploitation of the Cerrillos turquoise mines after A.D. 1680 by Pueblo Indians as well as American entrepreneurs of the 19th and 20th centuries. A sherd or two of utility wares, resembling Lino Gray of Basketmaker III time, left unanswered the questions concerning the beginnings of turquoise mining in the Cerrillos district.

Basketmaker III Pottery of the Rio Grande

Archaeological sites of Basketmaker III period were found in the Rio Grande Valley and included both San Marcial and Lino type ceramics. Chronometric dates were rare for this time period, but Frisbie (1967) obtained an archaeomagnetic date of A.D. 580±40 from the floor of a pithouse at the Artificial Leg site, Corrales, New Mexico, which produced an artifact of turquoise. Despite the absence of positively identified pottery of Basketmaker III time at the Cerrillos turquoise mines, the possibility of Indian turquoise mining during this period cannot be discounted.

Ceramic assemblages that could be assigned to the Basketmaker period in the Middle Rio Grande were described by Mera (1935). Archaeological sites that could be assigned to Basketmaker III time occurred as far north as Cochiti Pueblo in the Rio Grande Valley and included mineral-paint as well as red slipped and smudged pottery, some of which was intrusive from the Middle Rio Grande. Pottery types included Lino Polished (Morris 1936), Lino Gray (Hargrave 1932), Lino Red (Wendorf 1954), Lino Smudged (Haury 1940), San Marcial Black-on-white (Mera 1935), and San Francisco Red. In northwestern New Mexico, similar assemblages were recently dated between A.D. 500 to ca. A.D. 750 (Hayes 1981 et al. 1981).

Mineral Paint Wares of the Cerrillos District

Potsherds of mineral paint wares intrusive to the Rio Grande area from the eastern Red Mesa Valley and possibly the Zuni area were found in significant frequencies at the turquoise mines at Mina del Tiro, Mount Chalchihuital, Franklin, and Firefly. Locally made counterparts of the western wares were also present. Identification of intrusive pottery from various areas in northwestern New Mexico was made by examination with a stereoscopic microscope and comparison was made with dates obtained previously during petrographic source area studies (Warren 1977, 1980). The problem of mineral-paint pottery identified as Red Mesa Black-on-white and Kiatuthlanma Black-on-white from northwestern New Mexico has been discussed above.

The present ceramic evidence from at least four mining areas in the Cerrillos district indicates that turquoise was being mined by local Rio Grande residents with economic or cultural ties with the Pueblos of the eastern Red Mesa Valley some time between A.D. 1000 to 1150.

Carbon-Paint Wares of the Rio Grande Valley

After A.D. 1200, potters in the Rio Grande Valley began to produce vessels decorated with carbon paint. Major types included Santa Fe Black-on-white and Galisteo Black-on-white. By A.D. 1300 or shortly thereafter, three other carbon-paint wares, Wiyo Black-on-gray, Abiquiu Black-on-gray (Biscuit A), and Bandelier Black-on-gray (Biscuit B) were being made in the northern Rio Grande.

These types occurred in small but persistent quantities through time at the Cerrillos turquoise mines. Speculations concerning the origins of
these wares have been numerous, and the most common suggestion is that people were moving into the Rio Grande from the San Juan Region. The occurrence of the carbon-paint wares at Cerrillos between A.D. 1200 and 1375 may indicate occasional mining activity at the turquoise mines during this period.

**Rio Grande Glaze-paint Wares of Cerrillos**

Although the beginnings of the glaze-paint tradition and technology are still uncertain, the ware spread rapidly throughout the Rio Grande region shortly after A.D. 1300 and maintained its popularity for nearly 400 years. During this period the villagers of Jemez and the Tewa areas in the northern Rio Grande continued to use carbon paint to decorate their vessels. Because the glaze-paint pottery required lead minerals to make the glaze, Cerrillos and other mining districts in the Middle and Upper Rio Grande regions experienced extensive mining activities. It was during this period that the turquoise mines of Cerrillos saw their greatest activity as well. However, a hundred years may have elapsed after the first glaze paint pottery was produced before either lead or turquoise was mined at Cerrillos.

In 1933, Mera defined the existing classifications of Rio Grande Glaze Paint Wares based upon rim forms supplemented by color and design differences. At that time, he also established six groups based upon rim form changes through time. Group A glaze-wares were produced from about A.D. 1325 to A.D. 1425 and included four pottery types. The last to develop was Cieneguilla Glaze-on-yellow during the last decades of the 14th century. The earlier redwares, Agua Fria Glaze-on-red, San Clemente Glaze-polychrome, and Arenal Glaze-polychrome were the major glazewares throughout the 14th century. However, only two sherds of Group A redwares were identified at any of the turquoise mines in the Cerrillos district.

With this in mind, it seems probable that turquoise mining was not an important economic activity in the Rio Grande until after A.D. 1375. Temper analyses of the potsherds of Pueblo IV time at seven mining areas showed that from 59 to 91 percent of Pueblo IV potsherds came from vessels made at San Marcos Pueblo.

**The Historic Pottery of the Cerrillos Turquoise Mines**

The numerous Spanish explorations during the 16th century and colonization in 1598 appeared to have little effect upon the ceramic traditions of the Pueblos. Mining of both turquoise and lead ore for glaze continued at least until the Pueblo Revolt of 1680. At that time, many of the Pueblo Indians left their homes; pottery making declined; and soon after A.D. 1700 the tradition of glaze-paint was abandoned (Warren 1979: 192-216).

Potters of the post-Revolt period reverted to using carbon or mineral paint for decorating their pots; many did not paint their pots at all. New settlers may have introduced their own traditions. It would be difficult to trace a pottery "type" of the post-Conquest period in the late 17th and early 18th century to its source. Although a few sherds of post 1700 historic vessels have been noted at the Blue Jay and Grand Central turquoise mines, these have not been assigned to a cultural phase.

**Utility Wares at the Cerrillos Mines**

Utility ware sherds were rare at prehistoric turquoise mines in the Cerrillos area and occurred mainly at those worked during Pueblo III time. A few sherds were from vessels that were probably produced in the eastern Red Mesa Valley. Others contained
red granite grus or mica shist temper and appeared to have been made in the Rio Grande region.

INFERENCES

Based on these ceramic data, there was some evidence to suggest that there may have been some use of the Cerrillos district turquoise mines by Anasazi who did not live in the Middle or Upper Rio Grande areas or who moved into the area about A.D. 1050. The late Kiatuthlanna Black-on-white and Gallup (Prewitt) Black-on-white sherds found at the Mina del Tiro, Franklin, and Firefly mines indicated ties to the eastern Red Mesa or Prewitt area. This area has been considered part of the Chacoan system and had numerous outlying sites in the region (Powers et al. 1983; Marshall et al. 1979).

It has been suggested that the Chaco region may have been an important trade center through which turquoise was obtained by Mesoamericans (DiPeso 1968; Kelley and Kelley 1975). While Cerrillos was the closest source of turquoise found in Chaco Canyon, the data have not supported the proposition that turquoise found in Chaco necessarily came from Cerrillos. Mathien (1981a) has reviewed the data on major trade routes between the Chacoans and their Mesoamerican neighbors to the south; she has suggested that there were numerous sources of turquoise that could have been mined to produce the artifacts found in Chacoan sites. Definitely imported from outside the Chaco region, it could have come from any number of prehistoric turquoise mines (Mathien 1981a: Appendix C). While neutron activation studies have been underway for a number of years (Weigand et al. 1977), the exact source of Chacoan turquoise has not yet been identified (Mathien 1981b).

Data on prehistoric use of turquoise by the Anasazi, particularly, the Chaco Anasazi, have been compiled (Mathien 1981a: Appendix B). In the Chaco, there was evidence of turquoise artifacts in sites dating as early as A.D. 500, but the larger number of artifacts did not appear until after A.D. 900. It is during the Bonito Phase of Chaco that the first evidence for manufacture of turquoise jewelry appeared (Mathien 1981c). At the outlying Chacoan structures, turquoise appeared around A.D. 800-900, but was again most prevalent after A.D. 1000. Data available for the eastern and western Anasazi reflected a similar pattern with major increase in turquoise artifacts appearing at sites dating after A.D. 1050. Evidence from the Hohokam and Mogollon was similar; Mathien's data were in agreement with Snow's (1973) study of turquoise distribution.

While the number of sherds found could not be used to calculate the amount of turquoise mined and traded out, the few sherds found in the district that could link Chaco to Cerrillos seemed disproportionate in number to the amount of turquoise found in Chaco Canyon. The Kiatuthlanna and Gallup (Prewitt) Black-on-white sherds indicated that Cerrillos turquoise reaching Chaco Canyon could have been obtained through the southern Chaco as outlying sites in this area had more turquoise artifacts than sites in any other outlying area (Mathien 1981). It is likely, too, that the Chacoans, as well as other Anasazi, used a number of sources and trade networks from A.D. 500-1700 and did not rely on Cerrillos alone. And it is most likely that people living in the mining area were the major users of the mines.

For the Cerrillos mining district, this seems a likely proposition. Stuart and Gauthier (1981: 44) summarized data on 1168 site components listed for 600 of the 12,000 square miles in
this area where there was reasonably good information (Table 11). Prior to A.D. 1150, there were relatively few people living in the upper Rio Grande. A total of 10.9 percent of the site components covered a span of over 4000 years. However, in the 150 years from A.D. 1175-1325, 32.5 percent of the site proveniences were occupied. An additional 20.5 percent of the site proveniences were dated to A.D. 1325-1540, a 215 year period. After that site density decreased.

When Tables 10 and 11 are compared, the data suggest that the percentage of site proveniences greatly outweighs the percentage of ceramics attributable to Pueblo III at the mines. While only tentative suggestions for future study can be made since these data are incomplete, it seems as if the most likely scenario was that the local inhabitants did most of the mining. The number of sherds from areas outside the Rio Grande at the mines are approximately 20 percent; yet, the overall number of site proveniences is much higher than the sherds would indicate when compared to Pueblo IV, for instance.

For Pueblo IV, nearly all ceramics from the Cerrillos mining district can be attributed to Upper Rio Grande pueblosan use of the area. It might be suggested that prior to Pueblo III, the Cerrillos district was used by all Anasazi, and during Pueblo III or post 1100 when the Chacoan world was disintegrating, there may have been an impetus for some to settle in the upper Rio Grande area. Whether these people were absorbed into local groups is unknown; but during Pueblo IV, use of the mines seems to have been limited to peoples from the upper Middle Rio Grande. With the influx of Spanish and other foreigners after A.D. 1600, use of the Cerrillos mining district decreased considerably.

Trade networks were very likely more extensive among the Anasazi than we recognize. The Pan-Anasazi ceramic types, e.g. Lino, suggest a ready flow of information by Basketmaker III/Pueblo I. It is only after A.D. 900 that the Chaco, Mesa Verde and Kayenta areas became distinct. The Upper Rio Grande may have been one of the last regions to fill up, and only during Pueblo III and IV might it have coped with increasing population densities by placing some ethnic

<table>
<thead>
<tr>
<th>Time Period</th>
<th>No. of Sites</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archaic-Basketmaker II 3000 B.C.</td>
<td>1168</td>
<td>99.9</td>
</tr>
<tr>
<td>to A.D. 600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basketmaker III</td>
<td>78</td>
<td>6.7</td>
</tr>
<tr>
<td>Pueblo I</td>
<td>8</td>
<td>1.3</td>
</tr>
<tr>
<td>Pueblo II</td>
<td>34</td>
<td>2.9</td>
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<tr>
<td>Pueblo III</td>
<td>380</td>
<td>32.5</td>
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<td>6.2</td>
</tr>
<tr>
<td>Unknown Anasazi</td>
<td>97</td>
<td>8.3</td>
</tr>
<tr>
<td>Unknown cultural affiliation</td>
<td>192</td>
<td>6.4</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1168</strong></td>
<td><strong>99.9</strong></td>
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</tbody>
</table>
boundaries upon the landscape. This, too, might be reflected at Cerrillos. If so, then other Anasazi may have traded with people from the Upper Rio Grande to obtain certain raw materials, e.g., turquoise.

Based on the identifications of ceramic types and percentages assigned (Table 10), the greatest use of the Cerrillos district occurred during Pueblo IV. If this distribution were in part due to ceramic scatters created and dispersed while mining lead, then it would be anticipated that the greatest number of Pueblo IV sherds would occur in the areas closest to the lead mines. In some ways this seems true since the greatest number of Pueblo IV sherds are found at the O'Neil mines which are between the Bethsheba and Mina del Tiro lead mines. However, the O'Neil mines are on the other side of the dirt road that runs up the arroyo. In addition, the number of sherds at the Mina del Tiro turquoise pits does not show an increase in Pueblo IV, but a decrease. Furthermore, it is assumed that the sherds found at the prehistoric turquoise mines reflect use of those mines and not scatter from use of lead mines in the area.

Future studies will help to clarify some of these points.

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EARLY PIMAN AGRICULTURE: A NEW LOOK

John P. Wilson

INTRODUCTION

Aboriginally Papago farmers made plantings to take advantage of both summer and winter moisture. Fall-sown wheat replaced native crops in the earlier planting. A series of small archaeological sites, adjacent to alluvial fans in the Avra Valley of southern Arizona, probably represents prehistoric farming with winter moisture.

West of Tucson, Arizona, is a broad alluvial plain called the Avra Valley. This plain separates the Tucson Mountains and the Santa Cruz River Valley on the east from the Papago Indian country or Papaguerla on the west. Several major arroyos meander northward across this valley, but it has no axial stream or other permanent water sources (Figure 1). Dense mesquite borders the drainages while creosotebush flats with scattered mesquite dominate the landscape elsewhere.

In February-March 1981 a utility corridor survey at the north end of this valley ran for several miles along the margin of a creosotebush plain just west of an arroyo floodplain. A series of shallow, sandy-bottomed, interbraiding little rivulets disappeared here into alluvial fans created as the rivulets deposited their loads. Individual fans were up to 150 m. in length and narrow in proportion. Older, no longer active fans could also be seen (Wilson 1981).

Along one or both sides of each fan area were found three to five small prehistoric pottery scatters and refuse areas (Figure 2). These small sites began where a fan started and ended where it ran out. This apparent association between archaeological remains and alluvial fans became evident only as these were mapped out. Individual sites areas were all clearly defined and from 10 to 15 m. across. Most dated to the A.D. 1150-1215 period.

Utility corridor surveys in 1980-1981 marked the first systematic archaeological work in the Avra Valley, and one of the research objectives was an initial understanding of land use through time (Wilson 1980, 1981). The survey findings suggested an association of the little site areas with use of the fans for floodwater farming, after the model of ak chin or "arroyo mouth" fields cultivated by the Hopi, Zuni, and Papago Indians (Bryan 1929; Haek 1942; Castetter and Bell 1942: 44-45, 125, 150-155, 168-170; Cushing 1974: 152-154, 157-166, 174-212; Nabhan 1982).

Papago farming plots were almost without exception located at the mouths of washes, where they could be watered by flood water of the summer rains, and groups of relatives camped for generations at the same washes. In the Papago country every suitable plot of this kind was utilized, and in many cases the plantings were necessarily very small. These pieces of alluvial land had few or no stones, and any found there were carried away in baskets to the edge of the field (Castetter and Bell 1942: 125).

Various scholars have sought to understand how the Pima-Papago farmers coped with a harsh desert environment and to describe the changes that have taken place over three centuries; also to explore the possible implications for understanding prehistoric set-
Figure 2. Locations of the small prehistoric pottery scatters and refuse areas relative to the alluvial fans, northern Avra Valley. Site numbers are Arizona State Museum system.

Figure 1. The northern Avra Valley and location of area with the small alluvial fans. 3000 ft. contour interval indicated.
tlement and subsistence strategies (Castetter and Bell 1942; Ezell 1961; Winter 1973; Gasser 1976; Doelle 1976, 1981; Bruder 1977; Nabhan 1982; Riley 1982: 54-67). From this body of literature a confirmation of the relationship (if any) between fans and sites in the northern Avra Valley should have been relatively easy. Such was not the case.

Summers in the Avra Valley are extremely hot with daily maximums averaging over 100°F. during the three hottest months. Evaporation is very high also, and the growing season is at least 210 days. At the Red Rock weather station a mile east of the survey area, the annual rainfall averages 9.5 inches. By reference to Hack's (1942: 23) criteria for the lower zone of floodwater farming in desert regions—less than 9 inches of rainfall and an adequate growing season—the Avra Valley is marginal for floodwater farmers.

Southern Arizona normally receives half or more of its annual precipitation from July through September with a lesser precipitation peak in December or January. All southern Arizona weather reporting stations show this winter rainy season (Green and Sellers 1964; Sellers and Hill 1974). Winters are mild and pleasant, and comparatively low evaporation during the winter months conserves soil moisture. During the February–March 1981 survey the deep penetration of this winter moisture into alluvial fans was readily observed. With the reduced evaporation, this winter moisture might be as useful to plants as that from the summer rains. Yet 20th-century accounts of Papago farming assume that ak chin fields have been associated exclusively with the summer rains.

There are no historical references to Papago Indians living in the Avra Valley prior to the 20th century, nor is the valley mentioned in any known traveler's journal. The normal routes of travel lay along the Santa Cruz River just to the north. Without local background data the best prospect for modeling an agricultural system that made use of winter moisture was to compare recent Papago farming practices against earlier accounts, beginning with those of Father Eusebio Kino and Captain Juan Mateo Manje from the late 17th century.

This was done, and one result was to first question and this discard some basic assumptions. Castetter and Bell (1942: 149) wrote that a source of drinking water was necessary for Papago farmers to move to their summer camps or temporales and begin planting. However, in the past a water source may have been desirable, yes, but necessary, no. Both Manje and Lieutenant Martín commented upon the lack of domestic water at Santa Catalina de Cuitubaga in their diary entries for November 22, 1697:

"... This rancheria has 25 houses with 100 souls. The place is very dry and without water. For drinking they go to bring it from some little springs which are very far to the west. They do this in order to have this advantageous place for planting (Smith, et al. 1966: 43)."

More recent observers including Ruth Underhill's Papago informant, Chona, confirmed this attitude. To live remote from a water supply might have been inconvenient, but it could be accommodated (McGee 1898: 368; Burrus 1971: 509; Underhill 1979: 14, 36; Masse 1980: 21).

Another casualty was the assumption that Papago farmers had made but a single planting each year (Castetter and Bell 1942: 144-151, 179). This was questioned after reading W.J. McGee's (1898: 368, 371) fine-grained description of Papago settlement patterns and their annual round of activities ca. 1895:
But the season is a variable one; the season for planting is the time of storm or freshet, come when it may; and the season of harvest is the time of maturing or ripening of the produce, be it May or September, for advantage is taken of the summer freshet as well as the winter one. ... While the late winter rains are bringing verdure to the mountains and sending slender streamlets into the arid valleys, the tribesmen gradually return to their rancherias, ... and await the fit moistening of the soil at the temporales. At the proper day they go forth to plow and plant, and watch the rapid maturing of the crops. With the harvest time the temporal is normally abandoned and the produce transported to the rancheria. At about the same time the fruits of the sahuaro and other cacti ripen, and soon afterward the beans of the mesquite mature, and these uncultivated crops are in like manner gathered and stored.

Here he clearly stressed the priority of planting during the winter rainy season, with advantage taken of the summer rains as well. This seasonal planting, dependent upon rainfall, was also called farming de temporal.

McGee’s description was supported by some of the crop reports by Kino and Manje. Manje’s journal entry for November 2, 1699, again at Santa Catarina, said that the missionary party was given:

... a variety of watermelons and cantaloupes, [and] ears of corn which they were picking then. So rich is the land that although they sow de temporal, they harvest two crops a year (Burrus 1971: 464).

The earliest account to suggest that people planted with winter moisture in Papaguería was for the waterhole of Gubo, now Pozo Verde (a few miles west of Sásabe), where Manje implied the existence of corn fields on June 9, 1694 (Burrus 1971: 192, 310). In the autumn of 1699, traveling west of San Xavier del Bac, Kino and Manje found only ephemeral waterholes and four small rancherias, whose natives

... sustain themselves by hunting deer, hares and rabbits, and with some maize which they plant during the rainy seasons (de temporal) but that yields very little (Burrus 1971: 254, 453, 464).

On the night of April 8, 1701, Father Kino and his companions

... arrived at that (rancheria) of El Tupo, all these places also being very poorly supplied with water, although the natives had already planted their crops of maize, beans and calabashes (Bolton 1919 I: 291).

Manje’s journal for the same area had omitted any mention of crops (Burrus 1971: 481, 509). El Tupo, or Tups as Manje called it, was 10 leagues west of San Xavier. In settlement after settlement, however, both explorers’ journals were either silent with respect to crop conditions or noted only that the lands were sown de temporal. Seventy-odd years later, the diaries of Juan Bautista de Anza and Father Francisco Garcés had these entries with respect to the Papago country:

The water which is to be found in a few places is very little in amount, and for lack of it they plant no crops. The only ones they raise are those which grow with little moisture, such as calabashes, watermelons and muskmelons, and the winter rains have to be unusually good
in order that even these may not fail (Anza diary for January 23, 1774, in Bolton 1930 II: 147-148).

Their lands have some sites with good pasturage, and when the rains of winter and summer are regular they harvest sufficient provisions, and have the necessary water in pools (Garcés diary for February 7, 1774, in Bolton 1930 II: 319-320).

The consensus from these observations is that Papago agriculture aboriginally followed an ideal of an early spring planting to draw upon winter moisture with a second planting during the summer rains.

In recognizing the opportunism in this planting cycle and the strong element of risk, Kino anticipated McGee by nearly two centuries:

A little before noon [November 11, 1701] we passed by the rancheria of San Rafael del Actun El Grande, where we found that the captain of it had already set out with many other Indians to look for maize, for here none had been raised, on account of the scarcity of rain this year at the time of their planting, ... (Bolton 1919 I: 309).

In the present Santa Rosa valley the summer rancherias had evidently had good harvests of corn, beans, squash, and watermelons in 1698, whereas for 1699 both Kino and Manje's journals were silent about foodstuffs, implying that this was a poor crop year in the same valley (Smith 1966: 21; Bolton 1919 I: 207-208; Burrus 1971: 453-454, 464-466). Even irrigation from a permanent stream did not eliminate uncertainties. At San Marcelo del Sonoyta Captain Manje was only able to buy some beans in February 1699, while the previous October Father Kino passed there and wrote that "... this year they had not sowed these (lands) except for many squashes, ..." (Smith 1966: 21; Burrus 1971: 228-229, 390, 411). In other years San Marcelo was more productive (Bolton 1919 I: 255, 310). Manje attributed some of these deficiencies to native indolence.

The aboriginal Papago pattern of two plantings annually should not be too surprising since the Gila River Yumans and those Pimans with ditch irrigation normally sowed twice a year (Castetter and Bell 1942: 144-148; 1951: 146-147). The Colorado River Yumans did this in at least some years (Ibid.: 149), and the prehistoric Hohokam may also have made two plantings (Bohrer 1970).

As a basis for comparison with the Avra Valley archaeological findings, this historical model of Papago Indian practices suggested that small alluvial fans in the Avra Valley were potentially ak chin fields, farmed with the moisture from winter rains.

Why did the Papagos cease cultivating their temporales with winter moisture? Actually their knowledge wasn't lost, or forgotten. What happened was that fall-sown wheat superseded the early spring sowings of corn, beans, and squash. Agronomists and ethnohistorians have been aware of wheat's importance to the Pima-Papago, but they have overlooked the fact that wheat replaced an early spring planting of the aboriginal crops (Castetter and Bell 1942: 49-50, 75-78, 114-117; Ezell 1961: 33-34; Doelle 1976: 17-18).

Father Kino and his associates have been credited with introducing wheat to the Pimans of present-day southern Arizona and northern Sonora and to the lower Colorado River Yumans as well. The preferred sowing time was November, with harvest during the following April or early in May (Bolton 1919 I: 234-235, 277, 291, 310, 321, 373, II: 160, 201, 204; Burrus 1971: 263, 323, 496). At San Xavier at least the production statistics in
the early years were impressive: from 15 fanegas of wheat in 1697 (Burrus 1971: 378) to 50 fanegas of wheat and corn harvested in 1698 (Smith et al. 1966: 13; Burrus 1971: 561) and 100 fanegas of wheat in storage by early March of 1699 (Burrus 1971: 402; see also p. 510). By 1716 Father Velarde could and did write that the Pimans ... since they have had intercourse with the Spaniards, and the padres entered the country, they harvested considerable wheat, especially those of the West, ... (Wyllys 1931: 128; Burrus 1971: 642).

This conversion was entirely in line with the Spanish government's active policy of extending its agricultural system to the New World (Whitaker 1929) and with the fall-sowing of wheat in the Mediterranean world since ancient times (Semple 1928; Jasny 1944). In 1774 the Gila River Pimas reportedly raised fields of wheat "... so large that, standing in the middle of them, one cannot see the ends because of their great length" (Bolton 1930 II: 127; see also pp. 126, 304). Nor was irrigation necessary for a good harvest. By the 1770s wheat was an important crop among the Maricopas and the Colorado River Yumans, both of whom relied upon natural flooding by the Gila and Colorado rivers (Bolton 1930 II: 173, 264, III: 320-321, 372, IV: 51-52).

We do not know when the Papagos first began to cultivate wheat, but it had assumed some importance by the late 1870s and remained so into the early 20th century (Castetter and Bell 1942: 75-78; Nabhan 1982: 50). Nabhan's (1982: 49-71) valuable compilation of late 19th and early 20th century observations on Papago farming has made clear the role of weather vicissitudes, which led to an abundant harvest one year and none the next.

It would be helpful to know what varieties of wheat the Pimans grew, but early records are silent. Russell (1908: 90) noted that as of 1901-1902 "Sonora" and "Australian" were favorite varieties among the Gila River Pimas, while in 1928 two Arizona Agricultural Experiment Station bulletins state that "Papagos grow mostly Sonora wheat which is very drought-resistant" (Clark 1928: 247), and "Sonora wheat has been grown longer in Arizona than any other and it often gives very satisfactory yields" (Briggs and Hawkins 1928: 255).

Sonora wheat is a soft, white, early-maturing variety with a spring growth habit, used largely in making such foods as tortillas (Stewart 1918: 28; Castetter and Bell 1942: 116). A second variety—Early Baart—mentioned as grown by the Papagos was introduced only about 1900.

Another early Agricultural Experiment Station bulletin explained why the fall-sown wheat succeeded so well in southern Arizona:

Barley, wheat and oats are not killed or seriously injured by the lowest temperatures that occur in southern Arizona. On the contrary, they continue to grow during most of the coolest weather of the year. ... It is the hot dry weather of summer that the small grains and most of the perennial grasses can not endure, their growth being limited almost entirely by heat rather than by cold. ... During the hot weather of June, July and August the seed will not start, even though supplied with plenty of water. November is ordinarily the most favorable month for sowing grain. Evaporation being comparatively slow during the weather that follows, grain sown in moist soil during this month usually needs no irrigation until February or
March if there is an average amount of winter rainfall. All sowings of all varieties ordinarily ripen during May or the few days that precede or follow this month (McClatchie et al. 1916: 75-76).

Father Kino couldn't have said it better. Today, at elevations up to about 3000 ft. in southern Arizona, improved varieties of spring wheats are usually planted in December or January for harvest in May or June. Technically these wheats have a spring growth habit, but they are grown as winter wheats, hence are called "fall-sown" (Dennis et al. 1980; personal communication, Robert E. Dennis, December 9, 1982 and March 24, 1983). As we have seen, the practice began in Kino's time.

Castetter and Bell (1942: 49-50, 114-117), Ezell (1961: 34) and Doelle (1976: 18) all recognized the importance of wheat as an "off-season" crop harvested in May, which in the traditional Papago calendar was the "painful or hunger-hurting moon." The fall planting of wheat in November or December simply continued the ancient practice of raising two crops a year, given suitable moisture conditions. Less-well adapted crops were replaced by a more reliable one in the planting cycle.

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Wheat in the New World has received virtually no attention from anthropologists. For an introduction to this subject I am indebted to Dr. Arden Baltensberger of the College of Agriculture, New Mexico State University, and to Mr. Robert E. Dennis, Extension Agronomist, University of Arizona.

Las Cruces, N.M.

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The protohistoric period has been defined as the "times immediately preceding historic time" (Webster's Third New International Dictionary, 1961: 1825). For the purposes of this review, the protohistoric period will include the 16th and 17th centuries, terminating in the early 18th century. During this period, the Spaniards initiated sporadic contacts with the native peoples of the study area, ultimately leading to massive sociocultural changes throughout what is now northwestern Mexico and the southwestern United States (for the most recent general review of this period, see Wilcox and Masse 1981). As the frontier of New Spain expanded north, these contacts intensified, ultimately culminating in the epic missionary efforts of the Jesuit priest, Eusebio Francisco Kino. By the time of his death in 1711, Kino had directly or indirectly affected most of the native peoples, particularly the Pimans (see Spicer 1962: 118ff). As used in this review, the protohistoric period is roughly equivalent to DiPeso's period of "Sporadic Spanish Contacts" — AD 1500-1700 (DiPeso 1958: 172).

A major group were the Pimans, members of the Pimic family or the Utaztekan linguistic stock (see Lamb 1964 for a history of the classification of this stock). Pimic, composed of Pima and the closely related Tepehuan language of Durango (Goss, 1968), is in turn divided into Lower Pima or Nebomes, spoken in Sonora, and Upper Pima of Arizona. Upper and Lower Pima are essentially identical languages—the distinction is largely a geographic one—with the two groups being separated by the Opata (Ellis 1968).

Father Kino reached the area that is now northern Sonora in 1687. As he explored the country to the north, Father Kino encountered five different groups of Pimans, all speaking closely related dialects. These groups were, in his terms: (1) the "Pima proper" of northern Sonora who lived along the headwaters of the Altar and Santa Cruz rivers, (2) the Sobaipuri of the Santa Cruz and San Pedro river valleys, (3) the Gileno, who lived along the Gila River as far as the present town of Gila Bend, (4) the Papago of the southern Arizona deserts, and (5) the Soba of the San Ignacio River and the coast of the Gulf of California (Bolton 1936: 246-248).

The differences among these groups were primarily economic in nature, with some minor dialectical variations as well. However, it is unclear whether these groups were self-perceived as distinct, which is particularly true for the Sobaipuri and the Pima. The Papago lived in the arid environments of southern Arizona in an area of no permanent streams, necessitating greater dependence on wild plant foods and a two-village annual pattern (cf. Underhill 1940). In contrast, the Pima and Sobaipuri lived along permanent rivers. Their subsistence was based on agriculture, with some dependence on irrigation, at least among the Sobaipuri (see Doelle 1975 for a review of Gila Pima irrigation at Spanish contact).

Both Sobaipuri and Pima villages were encountered along the Santa Cruz River by Kino (Bolton 1936), but the population of the valley underwent major changes in ethnic composition in historic times. As an indication of the change, San Xavier del Bac is
presently a Papago mission, yet it was founded in 1700 as a mission to the Sobaipuri (DiPeso, 1953:9). The large part of the Santa Cruz Valley was abandoned after 1773 due to disease and Apache raids (Winter 1973). A major Papago influx did not begin until the Franciscans brought in a number of converts to augment the declining native population in the early 1800s (Spicer 1962:132). The natives of both the Santa Cruz and San Pedro valleys intermarried and took joint action when needed. When the Apache and Jocome attached the Sobaipuri village of Gaybanipitea in 1698, they were met and repulsed by a force, under the leadership of Coro (see below), made up of Sobaipuri from the San Pedro valley and natives from the Santa Cruz valley (Bolton 1948, vol. 1:178-181). Spicer called these Santa Cruz natives Sobaipuri (1962: 127); DiPeso called them Pima (1956: 44).

The archaeological distinctiveness of Pima and Sobaipuri as separate entities has been questioned. Based on excavations at Quiburi and Gaybanipitea, DiPeso regarded the Sobaipuri as descendants of the late prehistoric Salado (DiPeso 1953: 141), due in large part to the presence of a number of puebloan traits among the Sobaipuri and their present-day descendants, the people of the village of Archie on the Papago reservation. However, a Pima origin has also been claimed for these same traits (R. Spicer 1949: 68). Certainly there is evidence for Pima-Sobaipuri interactions even before the migration of the Sobaipuri to San Xavier del Bac in the 18th century (cf. Russell 1980: 23). In terms of the archaeological record, Doyel has also denied the Salado-Sobaipuri link. Instead, he regarded the Sobaipuri as descendants of the indigenous red-on-brown ceramic tradition, which DiPeso has also suggested (DiPeso 1953: 139; Doyel 1977: 134-135).

Many of the differences between the Pima and Sobaipuri relate to the existence of a more centralized leadership among the latter, as well as their warlike nature. An anonymous author (1951: 192) wrote that "The most warlike among all the Pimas are those we call the Sobaipuris [sic], for they are born and reared on the border of the Apaches." As this 18th century account indicated, these differences were probably due in large measure to the location of the Sobaipuri on the northwestern frontier of Pimeria Alta and their role as a buffer between the Spaniard and the Apache. Such factors may have contributed to the recognition of Sobaipuri and Pima as distinct and separate entities by the Europeans. However, the recognition of Sobaipuri descent by some modern Papago (Hoover 1935) implied some sort of native cognition of differences as well.

The protohistoric period is best known from the pioneering work of DiPeso in the 1950s (1951, 1953, 1956). Based on his excavations at Quiburi (153) and Paloparado (1956), and on historic accounts, DiPeso distinguished between the Sobaipuri and the Upper Pima of the Santa Cruz valley. Doyel has denied the validity of this distinction, based on his own work at a protohistoric site in the middle Santa Cruz valley and comparisons with other, largely unreported, excavations at sites of this time period (1977). Instead, he regarded protohistoric sites in both valleys as almost identical (Ibid: 134-135). The archaeological pattern is one of similar assemblages and adaptations during the protohistoric period in the Santa Cruz and San Pedro valleys. Such differences that existed before Spanish contact may have been a result of different agricultural strategies. To the west, the Pima on the Gila practiced floodwater farming without irrigation (Doelle 1975) or possibly, with some small-scale irrigation (Winter 1973). In the Santa Cruz valley, irrigation was much more important (Doelle 1975).
late 17th century, Kino reported over 2,000 people living in 15 villages, depending on irrigation to raise maize, beans, squash, and cotton (Bolton 1939: 269ff).

Accordingly, given the linguistic, cultural, and archaeological similarities, it is difficult to differentiate between the Pima and Sobaipuri; further, it is unclear whether these distinctions were meaningful to the people themselves. For the purposes of this review, protohistoric manifestations in the San Pedro and Santa Cruz valleys will be treated together under the term Upper Piman. This follows Doyel's use of the term as a geographic referent for people with similar languages and minor local adaptational differences who were present in southeastern Arizona at contact (Doyel 1977: 135). Use of a common term focuses attention on the evident similarities, many of which are masked by the operation of a variety of factors in the contact situation. Such factors may even have led to the misidentification of several sites as Sobaipuri (e.g., Gerald 1968 for Quiburi or Piman; e.g., Fritz 1977 for the Paloparado site).

EARLY HISTORY

Some evidence suggests that European goods may have reached the study area before Europeans actually arrived. Hayden mentioned a restorable Spanish majolica bowl supposedly found on the floor of one of the structures at University Indian Ruin by Ben Wetherill (Hayden 1957: 18). Wetherill claimed the bowl was sent to the Arizona State Museum, but it has never been located. Some pre-contact burials at the Paloparado site had associated European goods, including a wrought iron knife blade with a burial in Compound B and an unidentifiable wrought iron object on the chest of an adult female burial in Compound A in association with Gila Polychrome and Sells Red bowls (DiPeso 1956: 345). A bronze spoon handle was found in a barro pit at Paloparado which resembled the bronze spoon found at Quiburi on the San Pedro River (DiPeso 1953: 111, 187-190). Several sherds of Spanish ceramics and pieces of glass were also recovered from various contexts at Paloparado (DiPeso 1956: 345).

In 1691 Kino established missions at Guevavi and Tumacacori on the lower Santa Cruz River. In 1692 Kino reached the Tucson Basin, the first white man to do so. That year he visited the village of Bac, south of modern Tucson. Two years later he journeyed farther up the Santa Cruz to the Gila River, becoming the first European to visit the ruins at Casa Grande (Cosulich 1953: 2). Kino did not mention any villages between Bac and the Gila, yet a map entitled "Teatros de los Trabajos Apostolicos," drawn in 1695-1699, depicts two villages in the Tucson area. Of these, San Cosme was nearest Bac, located on the west side of the Santa Cruz, while San Agustin was to the north, located on the east side of the river (Bolton 1936: 272-273). In 1697 Kino further arranged a meeting of Upper Pimans from the Santa Cruz and San Pedro valleys at Dolores, furthering the mission thrust (Spicer 1962: 126). In 1693 Kino visited the San Pedro valley, establishing visitas at Quiburi and Santa Cruz near the present town of Fairbanks. Quiburi was ruled by a headman known as Coro, later given the rank of Captain by the Spaniards. Some 500 people who resided in the village of Quiburi, the largest settlement in the San Pedro valley, lived by farming the area to the north (DiPeso 1953: 120). In 1698 the Apache-Jocome-Janos attack on the Sobaipuri village was repulsed by a force of Sobaipuri under the leadership of Coro (Bolton 1948, vol 1: 178-181). The victory, however, was a costly one: Quiburi was attacked and burned that same year by the Apache and
their allies. The Sobaipuri under Coro abandoned the site and retreated to Los Reyes near Sonoita (DiPeso 1953: 121).

The Sobaipuri returned in 1704, but it was a holding action at best. In spite of repeated requests, the Spaniards never sent a resident missionary, although they did establish a mission in 1757. In 1732 the Sobaipuri of the lower San Pedro River had left the valley to join the people on the Gila River. The final abandonment came in 1762, when the Sobaipuri left the area after years of Apache attacks, and joined villages at Suamea, Bac, and Tucson (Spicer 1962: 127).

In 1697 and 1698 Kino made additional visits to the Gila, travelling up the Santa Cruz River, and provided descriptions of several villages in the Tucson area (see Smith et al. 1966: 44-45). Another visit to Tucson was made in 1699 (Karns 1954); in 1700 Kino laid the foundation for the mission of San Xavier del Bac (Cosulich 1953). San Xavier acquired a resident priest in 1701, who died the next year. The mission did not have a priest again until 1732 (Bentancourt 1978: 22).

Kino died in 1711 and mission efforts declined. Due to disease, rebellion, and Apache raids, the Upper Pima population in Sonora was greatly reduced. Missionaries made renewed efforts in the northern part of Upper Pima territory. It was as part of this effort that San Xavier acquired its priest in 1732, and the mission at Guevavi was also renewed (R. Spicer 1949: 19). However, Apache raids continued, and a Spanish garrison was established at Tubac around 1750. Spanish mission efforts were severely set back by the Pima Revolt of 1751. In 1767 the Jesuits were expelled from the New World due to conflicts with the Spanish monarchy. In 1776 the garrison at Tubac was moved to Tucson, but increasing Apache raids resulted in the depopulation of most of the Santa Cruz between Tucson and the Gila (Winter 1973).

Less than a century after the arrival of the Spaniards into the study area, the San Pedro valley and much of the northern Santa Cruz valley had been depopulated. Native populations at San Xavier declined, ultimately to be replaced by an influx of Papagos from the west. The Apaches had become a major threat, due in part to Spanish policies, and the settlement pattern and culture of all the surviving Piman groups underwent drastic changes (Underhill 1939: 18). The historic period had begun.

**UPPER PIMAN MATERIAL CULTURE**

Recent reviews have indicated that Upper Piman sites are characterized by oval alignments of stone cobbles house foundations, undecorated and unslipped ceramics, minimally shaped grinding tools, and a chipped stone assemblage marked by small triangular points with indented bases and fine, often roughly trapezoidal, retouch (Doyel 1977; Fritz 1977; Masse 1981; B. Bartell 1981 personal communication). Sites are generally small and located on ascending terraces; although mountain sites are known, they have not been fully reported. The structures resemble those described by Pfefferkorn in 1767 in Sonora, although he did not mention the cobbles, which may have not been visible:

The dwellings of the Sonorans are all constructed alike. They are approximately the same size, height, width, and arrangement, and they are suited in every respect to a people whose condition is one of direct poverty. The materials used in their construction are tree branches, twigs, and zacaton (a plant similar to straw), cut to a point, and this point is driven firmly into the ground. In the middle of the house three or four of the
branches are made into arches equal in height and width. The arches are made lower and narrower toward each end until the finished structure assumes the shape of a bake oven. Twigs are laid crosswise on the floor and are bound to the branches which stand on both sides to make the structure durable and firm. Then the entire hut is thatched with the aforementioned zacaton in the same way that the houses of German peasants are covered with straw. That it may better shed rain, the thatch is sprinkled with earth. The diameter of the huts is generally not more than four ells, and they are hardly three ells high, so that a large man cannot stand inside without bowing his head.

The door, or round hole, which is the entrance to the house, is not much larger than the opening to a bake oven, and is so low that one must creep through it on hands and knees...Consequently, the Sonoran's palace is a single room, or, to speak, more correctly, a stall...Inside the hut the Sonorans light a small fire to warm their naked bodies when it is cold and to prepare their food (Treutlein 1949: 192-193).

This description can probably be extended to the Upper Pimans as well (Masse 1981: 28).

Most sites in southeastern Arizona fit this general Upper Piman pattern, with one minor and two major exceptions. The architecture and ceramics at Gaybanipitea conformed to the structures and ceramics discussed above, but the site contained over 20 structures, making it one of the largest Upper Piman sites excavated. The large size of the site may be due to aggregation in response to Apache raiding or a more productive subsistence system than employed at other sites. Alternately, the smaller sites may have been specialized activity sites of short duration. Doyel (1977: 132) has noted that the ratio of projectile points to ground stone tools increased greatly through time; perhaps some of these served as hunting camps. Based on evidence indicating (1) a settlement pattern of small dispersed habitation sites along the river, and (2) the conspicuous absence of large sites (except for Gaybanipitea), Doyel suggested that the Pima pattern of large nucleated sites may be more appropriate for understanding these sites than the Papago two-village pattern (Ibid.: 134).

The two major exceptions to the generalized Upper Piman pattern are Quiburi and Paloparado. The San Pablo phase at Quiburi was characterized by contiguous jacal structures, generally undecorated ceramics and Spanish ceramics; the succeeding Santa Ana phase was marked by brick or stone masonry with a few stone and mud structures, again generally contiguous. Ceramics included prehistoric, "Sobaipuri," and Spanish types (cf. Fritz 1977: 23). DiPeso interpreted the differences between Quiburi and the nearby site of Gaybanipitea as reflecting cultural differences between the southern Sobaipuri of Gaybanipitea, descended from the makers of red-on-brown ceramics, and the northern Sobaipuri heirs of the Salado tradition (DiPeso 1953: 127, 139). He also acknowledged the possibility that Gaybanipitea was a temporary settlement of single-unit summer homes, following Velarde's observations (Velarde in Wyllis 1931: 134; DiPeso 1953: 126).

In contrast, Doyel has interpreted the remains of Quiburi as the result of Spanish and Indian activity, further complicated by the mixing of early and late materials which were analyzed as contemporary. In his view, the site was not at all representative of the protohistoric pattern in the area.
(Doyel 1977: 135), a view shared by his analysis of ceramics and mortuary practices (1981: 37-38, 41-43). Gerald's earlier critique took these criticisms one step further, claiming the entire site of Quiburi was the post-Sobaipuri Spanish presidio (1968, cited in Fritz 1977: 26). If so, the question remains: why were none of the native structures described at the site by the Spaniards archaeologically visible? A number of possibilities exist. Given the limited extramural excavation at Quiburi many remains simply may not have been detected. It should be remembered that approximately 80% of the England Ranch sites which produced abundant remains were either surface collected or excavated. Other possibilities include re-use or destruction of native materials by the Spanish presidials or simply that DiPeso missed the village described in Spanish accounts (Fritz 1977: 26).

The Paloparado site presents a major problem in archaeological identification. DiPeso claimed that there was little relation between the protohistoric Upper Pima and the preceding Hohokam component at the site based on differences in village layout, house structure, ceramics, burial customs, and material culture (DiPeso 1956: 113). Nonetheless, considerable overlap occurred between components. As an example, three-quarter grooved axes were present in both (Ibid.: 205), as were Type I projectile points (triangular points with serrated edges) (Ibid.: 495, 502). Similarly, it is curious that no Hohokam caches were recovered at Paloparado but most Upper Piman caches at the site contained Hohokam items (Ibid.: 222); caches were abundant at other Hohokam sites (e.g., Snaketown, Haury 1976: 175ff). DiPeso regarded the differences in shell ornaments between the two components as qualitative in nature, with Hohokam materials better made, more elaborately executed and with more life forms, a characteristic of stone ornaments as well (Ibid.: 101). In contrast, the Upper Piman occupation featured a greater variety of stone, although the carved animal pendants, mosaic plaques and schist palettes of the Hohokam were absent (Ibid.: 114-115). At Snaketown, these features peaked during the Colonial Period (AD 700-900) and declined in quality and quantity (see Haury 1976: 354).

In ceramics, Ramanote/Paloparado Plain and Rincon red-on-brown occurred in both components. To DiPeso (1956: 330), this supported the idea of a short hiatus between occupations. The major ceramic differences were a decline in eccentric and unusual forms in the Upper Pima occupation, with a preference for deep hemispherical bowls (Ibid.: 324). Further, no indigenous decorated wares were produced during the Hohokam period; most decorated wares during this time period came from the Middle Gila drainage (Ibid.: 347).

Overlap in architectural features and house types also occurred (Ibid.: 324). Eight Hohokam houses were reused by the Upper Pima, indicating to DiPeso that the Hohokam village was still standing or at least visible when the latter took over (Ibid.: 239). Yet this was in opposition to the historic Pima practice of burning the house of the deceased with subsequent avoidance of the remains (Russell 1908: 194-195). The major difference in house types was a Hohokam preference for rectangular structures with numerous interior and peripheral posts and stepped lateral entry. Upper Piman structures had generally rounded corners and a sloped lateral entry (DiPeso 1956: 123ff, 229ff), a trend also evident at Snaketown (cf. Haury 1976: 74). It is interesting to note that both occupations had one round house. Upper Pima Type 2d was 1 m deep and 4.3 m in diameter, with a bulbous entry; the Hohokam version was 3.6 m in diameter but only 22 cm deep (Ibid.). The major difference in
village layout was a trend away from the dispersed pattern of the Hohokam occupation to the contiguous-walled compound pattern of the latter Upper Pima format (DiPeso 1956: 218-220). Such a trend is now generally thought to be the result of indigenous developments, rather than population replacement (see Wilcox and Shenk 1977).

Stratigraphic tests also supported the idea of overlap or continuity. Upper Pima refuse, found in floor contact in several Hohokam structures, had no associated Hohokam items; therefore, one cannot distinguish between Hohokam and Upper Pima artifacts in this context (Ibid.: 239-241).

Accordingly, the major remaining difference between the two components appeared to lie in treatment of the dead: the Hohokam cremating theirs and the Upper Pima inhumating theirs (Ibid.: 540). Yet even here some overlap may have occurred at least insofar as use of mortuary areas was concerned. Even though the Upper Piman inhumated their dead in special areas associated with each enclosed plaza, there was no re-use of the earlier central Hohokam area, suggesting that at least some sort of marker was still visible, if not an active community tradition (see Doyel 1979: 25). It should also be remembered that the Classic period Hohokam of the nearby Tucson basin employed both cremation and inhumation (see Doyel's 1979 review of mortuary practices in the area).

A review of the location of actual structures indicated that the Hohokam occupation was located to the west on the terrace. Village growth took an eastward trend. The Spanish materials excavated at the site all came from the eastern edge of the site (DiPeso 1956: 120-121). This trend suggested DiPeso actually uncovered a single occupation, with apparent temporal differences due to a gradual shift in structure location. This would account for the absence of burned Hohokam houses, which would be expected if they were in fact expelled by the indigenous O'otam (Ibid.: 265), as well as the "sharp differences" DiPeso noted between the Upper Pima at Paloparado and O'otam elsewhere (Ibid.: 510).

Doyel has also termed the late occupation at Paloparado a Classic period phenomenon, possibly with some indirect contact with the Spaniards during the protohistoric period (Doyel 1977: 135). Accordingly, he saw no connection between such Upper Pima sites as DD:8:129 and the "Upper Pima" component at Paloparado (Ibid.). Fritz has also grouped the site with the Hohokam occupation of the valley, pointing out that the temporal placement of the site was based on cross-dating of intrusive ceramics (1977:19; of DiPeso 1956: 20). In his view the Spanish materials were either from disturbed or post-abandonment contexts, especially the wrought iron artifacts from plaza burials which could have been intruded at a later time (Fritz 1977: 20).

The general picture of Upper Pima subsistence is often one of great dependence on irrigation agriculture, based in part on accounts of irrigation among the historic Gila Pima (Russell 1908: 86-89), such as described in this account of Padre Leal's impression of the Tucson Basin in 1699:

...having traveled through the whole valley, the fields and the agricultural lands, and seeing them so rich and fertile and irrigated by many acequias, it seemed to him sufficient not only for a mission of three thousand Indians, but for a city of thirty thousand persons (in Cosulich 1953: 17).

Similar accounts of early irrigation in the San Pedro Valley also exist (cf. DiPeso 1953: 235). However, recent reviews indicate that the Gila Pima were not irrigating at first contact. However, this technology became im-
portant later as European crops such as wheat were introduced, and as new markets developed for them, such as California-bound emigrants (Doelle 1975, 1981). Excavated protohistoric materials from the study area have indicated an economy with considerable reliance on wild plant and animal foods. The best evidence for irrigation came from the sites of Quiburi (DiPeso 1953: 234) and Paloparado (DiPeso 1956: 4, 203). Even granting these sites status as Upper Piman, the canals at Paloparado were shallow (ca. 5 cm deep), resembling ditches in the Tucson Basin (e.g., Kinkade and Fritz 1975) rather than the large canals of the Gila-Salt Basin. The temporal placement of these canals at Paloparado is unknown; given the chronological problems discussed earlier, they could well have been Hohokam.

Judging from Spanish accounts, the foodstuffs from Quiburi exhibited considerable European impact on native subsistence in the form of melons, wheat, barley, sugar cane, chili, sweet potatoes, and watermelons (DiPeso 1953: 235). Maize, beans, squash, and cotton were also grown (DiPeso 1956: 235-238). Animal remains showed a preponderance of European domesticates, including the cow, sheep, and pig in the Santa Ana phase; most bones were either charred or showed butchering marks (Ibid.). Wild animal remains at the site included rabbit, hare, deer, fish, and possibly pronghorned antelope were utilized by the inhabitants; a variety of wild plant food was also found (Ibid.). Judging from the two recovered pairs of headbearer antlers which were used in stalking deer (DiPeso 1956: 445), hunting was evidently important at Paloparado. Vegetal materials excavated at Paloparado included maize, mescal (Agave parryi), beans, grass seeds, and chenopodium seeds (Ibid.: 459-462). The maize was almost identical with modern Papago varieties and similar to that from Babocomari, although quite different from the maize from Quiburi (Ibid.). Beans included the common bean (Phaseolus vulgaris) and a few lima beans (P. lunatus). Tepary beans may have also been present, although they could not be positively identified. Grass seeds include Panicum fasciculatum from house fill, a vessel associated with a burial, and a stone-lined cist. Blue palo verde seeds (Cercidium floridum) were also found; these seeds were sometimes ground and eaten by historic groups; Chenopodium ferontii seeds were recovered from a bowl associated with a burial. Various native grasses, including bear grass, were evidently used as thatching and mat materials (Ibid.). However, as discussed above, there was considerable indication of mixing of deposits. There is the potential problem that the archaeologically-recovered materials at Paloparado and Quiburi could have come from either Spanish presidial (Quiburi) or prehistoric Hohokam (Quiburi and Paloparado) contexts.

Evidence from the England Ranch Ruin indicated a much more diversified economy. Less than 50 faunal elements were recovered, primarily from a communal trash dump. Only two species could be identified: deer and cottontail rabbit. Poor preservation precluded identification of most of the faunal material, a condition resulting from the large surficial nature of the site (Olsen 1977). The abundance of chipped stone materials indicated a considerable emphasis on hunting (or warfare) activities at the site, an inference supported by the small number of ground stone tools found at the site (Doyel 1977: 133; Masse 1981). In all likelihood, Upper Pima subsistence was based on the exploitation of a broad range of wild foodstuffs in a number of environments in addition to some agriculture, probably exceeding the 50:50 ratio of wild to domestic foods observed for the Piman (Castetter; see also Doyel 1977: 132-134; Masse 1981: 43-45). At pres-
ent too few sites have been tested
and reported to allow further testing
of this supposition.

HOHOKAM-PIMAN CONTINUITY

Briefly stated, there are three major
theories about the relationship be­
tween the Hohokam and the historic
Upper Piman peoples: (1) Upper Piman
descended from the Hohokam (Bande­
lier 1892: 462-464; Haury 1945: 211-
Ezell 1963; Hayden 1957: 191-201); (2)
the Upper Pimans were descendants of
the aboriginal O'otam who overthrew
the Hohokam invaders (DiPeso 1956:
13, 1956: 175, 197-199; Hayden 1970);
and (3) the Upper Pimans are de­
scended from the Sonoran groups who
entered the study area after the de­
parture of the Hohokam (Sauer and
Brand 1931: 117-119; Fritz 1977: 14-
16; Masse 1981). These theories have
utilized comparisons of traits, rather
than detailed studies of the nature and
modes of adaptation (see Debowski
1976 and Doelle 1979 for extended cri­
tiques of this approach). In contrast,
more recent approaches have begun to
employ an explicitly adaptational
framework in the study of the Hoho­
kam-Pima transition (e.g., Masse 1981,

Some of the theories which have
questioned the continuity of Hohokam-
Piman relationships have been based
on studies of peripheral groups whose
differences from the "pure" Hohokam
may be more adaptational than cultural
(e.g., DiPeso). Other critiques have
been based on a reading of a limited
series of Pima and Papago myths (e.g.,
Hayden 1970; see Bahr 1971 for an
analysis of a much broader range of
Piman myths about the Hohokam which
contradicts Hayden's view that the
Hohokam became the Buzzard moiety).
These criticisms also overlooked con­
siderable continuities in subsistence
(e.g., R. Spicer 1949: 15; Haury 1976:
117) and ceramics (Haury 1976: 197),
as well as architecture (e.g., the
presence of some round houses re­
ssembling historic Pima structures at
sites such as Paloparado (DiPeso 1956:
127, 224-225). Masse's thorough re­
view of Hohokam ceramics indicated
that there was insufficient evidence
to document a Hohokam-Pima contin­
uum. However, population decline and
possible reversion to a dispersed
rancheria settlement pattern may have
reduced the "visibility of remnant Ho­
hokam populations...[making] the gulf
between the Hohokam and Pima appear
greater than it is" (1982: 91).

Attempts to understand the con­
tinuity between historic and prehis­
toric groups have, in part, been ham­
pered by a general belief (1) that the
Upper Pimans had little contact with
Europeans after the death of Kino,
and (2) that descriptions of such groups
in the 19th Century could therefore,
with minor modifications, be accepted
as representative of the way of life
at first contact. To some extent, this
has been based on Spicer's hallmark
study of the impact of European and
American civilization on the peoples
of the Southwest (1962). This over­
looked the impact of subsequent native
rebellions and the establishment of
military garrisons composed of Upper
Pimans but organized and directed by
the Spaniards (Dobyns 1972) and
Apache and Spanish conflicts (e.g.,

Most importantly, such a view
also overlooked the devastating effect
of European-introduced diseases. An
excellent introduction to this aspect
of the contact situation was Dobyns'
study of the decline of the native pop­
ulation of the San Pedro and Santa
Cruz river valleys between 1700 and
1850 (Dobyns 1963) and the corres­
ponding growth of mestizo populations
in the Tucson Basin (Dobyns 1976).

Even so, the archaeological and
historical records have indicated con­
siderable continuity in basic adapta­
tions. This continuity has best been
expressed by Emil Haury:

...to assert that there was no connection between the Piman people and the Hohokam requires the removal of the latter from the area by about AD 1450 and the introduction of the Pimans with an impressively similar lifeway almost immediately. Contacts in the sixteenth and seventeenth centuries by Europeans indicate that the Pimas were comfortably adjusted to their desert habitat, a "fit" that bespeaks a long residence rather than exceptional cultural adaptability.... By placing primacy on the earth and by being protective of their environment, they forged a social and economic system that enjoyed 1,500 years of ascendency, and endured, on a reduced scale, for nearly 800 years more to the present day. Few people can match that record (Haury 1976: 357).

In order to understand this endurance, archaeologists must begin to examine the nature of native adaptations to local environments and strategies for coping with local resources and problems.

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For obvious reasons, this review is dedicated with respect and affection to the memory of Charles C. DiPeso.

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INTRODUCTION

Chichilticale known variously as an Indian ruin, a mountain range and pass, and a "province" was an important way station during the Coronado expedition of 1539-42. After the mid-1500s the west coast route to Cibola and the Southwest dropped out of use and the location of Chichilticale was eventually lost. In this paper the two most probable locations, one on the lower Salt River, the other on the upper Gila River, are discussed, and evidence for and against each one is given.

The site and area of Chichilticale (variously identified as a mountain range, a pass, an Indian ruin, and a "province") was important to the earliest Spanish southwestern expeditions. It stood at the edge of the last great despoblado separating the populous statelets of Sonora and the agricultural populations of the Gila-Salt Valley from Puebloan Cibola. In spite of this importance, the site was never firmly located, and after the mid-16th century it was lost to view. Spaniards traveling from Sonora to New Mexico in the 18th century made no mention of Chichilticale. Since it was a kind of mid-point in Coronado's journey from Sonora to the upper Southwest, a firm location of Chichilticale is obviously desirable in establishing the route of the Coronado expeditions and the location of a major pre-European trunk road from Mesoamerica to the Southwest.

A number of previous attempts have been made to locate Chichilticale. I shall briefly survey some important ones here, returning to a discussion of them as needed later in the paper.

Serious modern speculation on Chichilticale began with the wave of historical and anthropological interest in the Southwest that followed on the American occupation of 1846 and the subsequent heavy population movement into New Mexico and Arizona. Although two early American scholars, E. J. Squier in 1848 and H. C. Morgan in 1869, suggested a Chichilticale north of the Gila River (Schroeder 1955: 294), the commonest early identification of Chichilticale was with the spectacular site of Casa Grande near the Gila River. As late as the 1880s this identification seems to have had general acceptance. For example, according to Hubert H. Bancroft (1886: 84):

"... Chichilticale the "red house" probably is the structure since known as the Casa Grande on the Gila, then as now a roofless ruin."

Drawing on work done in that same decade, however, Adolph F. Bandelier made it clear that Casa Grande could not be a serious candidate as the site of 16th century Chichilticale. Bandelier (1892: 408-409) pointed out that the reasonably explicit descriptions of the country around the ruin of Chichilticale simply could not be equated with the area of the Gila River near Casa Grande. Bandelier's own location of Chichilticale was in the Fort Grant area west or south of Fort Graham and the Pinaleno Mountains (Bandelier 1892: 409). In May, 1883, Bandelier was told of "large-house ruins near Fort Grant" while visiting at Solomonville (Lange and Riley 1970: 99), and this presumably was the ruin that he had in mind.
A Chichilticale somewhere in the vicinity of the Pinaleno Mountains was accepted rather widely. In his landmark publication of accounts of the Coronado journey, George P. Winship (1896: 73) repeated the Bandelier identification with evident approval. In addition, the location in the Handbook of American Indians (Hodge 1907: 259) "on the Gila, E. of the mouth of the San Pedro, S. Ariz., probably not far from Solomonsville" was essentially that of Bandelier.

A detailed study of the Chichilticale question was published in 1908 by Samuel O. L. Potter, an army surgeon who had traveled through southern Arizona in the late 1860s. Potter located Chichilticale opposite the mouth of Pinal Creek on the north side of Salt River north of the present-day town of Globe, some 130 km northwest of the Bandelier location (Potter 1908: 273).

Little additional work was done on Chichilticale until 1932 when Carl O. Sauer published his landmark Road to Cibola which investigated anew the routes of the early explorers to the Southwest. In general, Sauer agreed with Bandelier in the location of Chichilticale. Like Bandelier, Sauer believed that the Coronado party journeyed up the San Pedro River and then up Arivaipa Creek and over Eagle Pass between the Pinaleno and Santa Teresa mountains. Sauer gave two likely locations for Chichilticale. He believed it to be either in the Arivaipa Basin, at the Haby ranch, or on the bluffs of the Gila about a mile north of Geronimo and a bit downriver of Fort Thomas.

A rather different location was given by George J. Undreiner (1947: 460). Undreiner believed that the site was first visited by Fr. Marcos de Niza in 1539 and that it could be identified with the cliff dwellings in present-day Tonto National Monument. Herbert E. Bolton, however, writing in 1949 essentially went back to the Bandelier and Sauer identifications and placed Chichilticale on the 76 Ranch at the foot of Eagle Pass (Bolton 1964: 106). Bolton also made a stab at identifying the name Chichilticale. He believed that it might be derived from "Chi-chilte and calli ... two Yaqui words still in use, and they still mean red house." Presumably, Bolton inadvertently substituted the name "Yaqui" for "Nahuatl."

A. L. Schroeder, in 1955, published an analysis of the placement of Chichilticale. Following, to some degree, the work of Potter, Schroeder (1955: 294) suggested that the ruin of Chichilticale is on the Salt River near the mouth of Salome Creek. He also (p. 295) discussed the meaning of the word Chichilticale. Aside from the identification of Chiehltic-calli as "Red House" in Molina's 1550 Aztec-Spanish dictionary, there were other possibilities for the word. Schroeder suggested the Apache Tli-chi-kowa, meaning "Red House," or the Apache Chi-chil-kain which referred to the Oak People Clan. The Yavapai word Chi-chi-itch-kwali with a meaning "Mother Plants" was one that had to be taken seriously in that Schroeder (1956: 33) believed that the Coronado groups first encountered Yavapai Indians in the region of Chichilticale.

No major new speculation on Chichilticale occurred until the publication of C. C. DiPeso's monumental work on Casas Grandes. DiPeso (DiPeso, Rinaldo and Fenner 1974: 98-102) had a variant route for the early Spanish parties. He believed that both Marcos and Coronado traveled first up the Bavispe River and then the Batepito and the San Bernardino, crossing the present international border at a point a few kilometers east of Agua Prieta. His Chichilticale was in the region of the San Bernardino drainage. The Sierra of Chichilticale included the Sierra de San Luis and the Peloncillo Mountains (pp. 98-99). According to DiPeso, Coronado's party, following
in Marcos' footsteps, swung north and east, roughly on the route of modern U.S. Highway 80, between the Chiricahua and the Peloncillos, past present-day Rodeo, New Mexico. The ruin of Chichilticale was one of the sites in the San Bernardino Valley. From Antelope Pass Coronado's army moved northward to the Duncan area, recrossing the New Mexico-Arizona line at that point. The party then went down the Gila to about the town of Guthrie and overland approximately to modern Clifton. At that point Coronado moved up the San Francisco and then the Blue River, again recrossing the state line to Luna and Spur Lake. The journey continued northward, entirely on the New Mexico side of the modern state line, crossing Carrizo Wash (Coronado's Bermejo River) and on to the Zuni River below Hawikuh. This route differs considerably from the traditional ones which have had Coronado traveling by Fort Apache and White River (Bolton 1964: 110) or through the Tonto Basin (Schroeder 1956: 32). In both of these proposed routes, Coronado went on over the Mogollon Rim and his Rio Bermejo was the Little Colorado.

I have discussed Chichilticale in a number of papers (Riley 1975, 1980, 1982) but I have always been rather cautious about choosing one route over the others in the face of conflicting and often scanty evidence. I did suggest (Riley 1982: 10, Fig. 4; 11, Fig. 5; 63) two alternate routes for Coronado and two locations for Chichilticale, one essentially that of Schroeder with a Salt River location, and the other a variant on DiPeso with Chichilticale located on the upper Gila River. I also made another stab at linguistic identification of the placename, suggesting that it might be some variation on the Piman word for house, kih or kihki (1982: 67).

Turning now to the actual evidence for Chichilticale, it might be well to say that, at present, there is no great help to be gained from archaeology. Eventually, when the region of Chichilticale is identified with reasonable certainty, the archaeological evidence will be useful. The current incomplete description of the ruin (given only by Castañeda) fits so many different areas of the Southwest that it gives very little in the way of leads. Indeed, some authors (Schroeder, for example) have been skeptical of the value of Castañeda's "Red House" comments.

The first Old World individuals to see Chichilticale may have been Esteban and Marcos de Niza in the spring of 1539. These two men led the first of a series of expeditions directed by Francisco Vásquez de Coronado, from the Spanish-controlled areas of central and west Mexico to the Greater Southwest. Unfortunately, Esteban was killed at Cibola (Zuni) and so never returned to tell his story. Marcos did not actually mention Chichilticale in his summary accounts to Viceroy Mendoza but, from later comments of Coronado, it is generally assumed that Friar Marcos had indeed seen or heard of the place (Hammond and Rey 1940: 165).

Chichilticale was also visited by a second exploratory expedition sent by Coronado in the winter of 1539-40 and led by Melchior Díaz. The latter man did not actually use the name in extant reports but later testimony by one of his soldiers did mention that Chichilticale was about 60 leagues from Cibola (ICC, Juan de Zaldívar test.). Díaz' own statements indicated that it was a very cold area.

Coronado, leading a vanguard to his expeditionary forces in the spring and early summer of 1540 marched from San Miguel de Culiacán to Cibola. He reached Chichilticale on June 19 after a trip of indeterminate length from the large Indian settlements of Coarazones. Coronado found that Chichilticale was 15 days from the sea (Hammond and Rey 1940: 165), and
spoke to Indians there who had made the trip. He also spoke of the "Port of Chichilticale" though it is not clear just where this "port" was located. It can hardly be at 35°N. latitude (that of Zuni) as Coronado claimed to have heard from Marcos. On leaving Chichilticale after a two-day stay Coronado encountered a 30 league despoblado with mountains and dangerous passes (Hammond and Rey 1940: 166).

One of Coronado's lieutenants, Juan de Jaramillo, also talked of Chichilticale. According to Jaramillo the party traveled down the arroyo "which we understood was called Nexpa" for two days. After an additional two days the party reached "the foot of the cordillera, where we learned that it was called Chichilticalle" (Hammond and Rey 1940: 297). From Chichilticale the party went into rugged and high country (p. 298).

Pedro de Castañeda de Náxera who was with the main Coronado army, several weeks behind the vanguard, also saw and described Chichilticale "where the despoblado began" (p. 207). The men were disillusioned to find that "the famous Chichilticale turned out to be a roofless ruined house, although it appeared that formerly, at the time it was inhabited, it must have been a fortress" (p. 207). Fifteen days march from this red mud ruin, the party reached the Rio Bermejo (p. 208).

In another part of his narrative Castañeda (pp. 251-252) gave our most detailed description of Chichilticale:

Chichilticale received its name because the friars found in this region a house formerly inhabited by people who broke away from Cibola. It was built of brown or red earth. The house was large and showed clearly that it used to be a fortress. It must have been despoiled by the natives of the region, the more barbarous people thus far encountered.

They live by hunting, and in rancherias, without permanent settlements. Most of the region is uninhabited. There are large pine forests and pine nuts in abundance. The pines that are found are squatty and have long branches upward of two or three estados in height. There are oak trees bearing sweet acorns, and fanonas which produce a fruit like that from which coriander preserves are made. When dried the fruit is very sweet, like sugar. In some streams watercress was found, and there are also vines, pennyroyal, and wild marjoram. In the rivers of this despoblado there are barbels and picones as in Spain. Gray lions were seen from the beginning of the despoblado. The land rises gradually until one reaches Cibola, which is eighty leagues by the northern route.

From Castañeda's account it would seem that the inhabitants of Chichilticale as of 1540 were not the builders of the Red House at least in Castañeda's mind. They were barbarous rancheria-builders who lived in great part by hunting. The relatively detailed description of the flora and fauna in Castañeda should give us some clues to the location of Chichilticale — unfortunately, it serves about equally well for the high country south of the Mogollon Rim and for the upper Gila drainage. The pines described by Castañeda very likely include Ponderosa (Pinus ponderosa and P. arizonica) and piñon (P. edulis). The oaks mentioned cannot be identified beyond the genus Quercus but a number of oaks are represented in the mountainous areas of southern Arizona and southern New Mexico. The fanona tree with its sweet fruit is more difficult. Strout (1971: 16) identified it as the anona or custard apple (Annona squa-
mosa). This plant, however, has a more tropical distribution, and as near as I can tell, did not appear aboriginally in Arizona. One of the native fruit trees, or even one of the fruit-producing cacti may have been meant. The "watercress" mentioned at Chichilticale, Strout (1971: 17) believed was Nasturtium officinale. Castañeda also mentioned "poleo" pennyroyal at Chichilticale as well as oregano. Neither of these plants is native, but Strout (1971: 23) suggested that mock pennyroyal (Hedeoma drummondii) may have been meant for the former. Any one of a number of grasses or riverine weeds might have been called "oregano."

Castañeda's "barbels" and "pi-cones" were identified by F. W. Hodge as catfish and Gila trout (Hammond and Rey 1940: 252). Whatever their specific identification, they are not very diagnostic as the alternative locations for Chichilticale discussed below are on the same river system. Castañeda's "gray lions" are most probably mountain lions, but these are too widespread to be of any use in establishing the area of Chichilticale.

None of the other extant Coronado documents mentioned Chichilticale. The papers of Pedro de Tovar, now lost, were available in the 17th and 18th centuries and the lawyer-historian Matías de la Mota Padilla, who wrote about two centuries after Coronado, seems to have made some use of them. According to Mota Padilla the Coronado party went through a little pass, which they named Chichilticale (that is to say, 'red house,' after one that was in it plastered with red earth called ochre); here they found pine trees with large cones of very good pine-nuts. Further on, at the top of some rocks, they found sheep skulls with large horns, and some said they had seen three or four of these sheep, and that they were very fleet (Day 1940: 93).

Surveying the various attempts to route Marcos and Coronado and the scattering of locations for Chichilticale, it seems clear that no single routing and location fits all the evidence at hand. Like all students of this matter, I have made my own choices in interpreting the data, and these choices must determine my own "judgment call" as to where Chichilticale should be located. First, I agree with Undreiner and Schroeder as to the basically western path of Marcos de Niza. Like Undreiner, I locate Marcos' town of Vaeapa somewhere in the Altar-Magdalena Valley (Riley 1971: 290, 311; 1976: 15; 1980: 44; 1982: 9, 10, fig. 4). I am, however, uncertain as to whether Marcos actually made the final leg of the journey to Cibola. If he, in fact, turned back, was it before or after he arrived at Chichilticale?

There is one point on which I am at odds with most people who have studied the Coronado documents. That is, I do not believe that Marcos and Coronado took the same route, at least for the Mexican portions of their trips. The main reason that people accept a single route for the two men is that Marcos in 1540 was supposed to have "guided" Coronado to Cibola. A careful reading of the relevant documents, however, really does not support this presumption and common-sense consideration makes it most unlikely. If Undreiner, Schroeder, and I are correct, Marcos stayed near the Gulf of California until he reached northwestern Sonora. This would have been a most impractical route for Coronado with numbers of horses (and, with the main Coronado army, stock animals and carts). Water and grass for such a large number of animals cannot be found near the coast at least from northern Sinaloa northward. Of course
on the last leg of the journey, Marcos and Coronado could have followed the same route, though even here Coronado would surely have preferred the Sonoran guides that we know were with the party.

At the present state of knowledge there really seems no way to establish a premiere single location for Corazones. Depending on a given routing of various Coronado parties it does seem to me that there are two most reasonable possibilities. I shall call them Chichilticale west and Chichilticale east (see Fig. 1).  

Chichilticale west. If one traces the Marcos and Coronado expeditions northward from the San Pedro/Gila junction, they likely entered the Salt River Valley along or near a route suggested by Potter and Schroeder. To give Schroeder's (1955: 285) excellent summation of the situation:

The most simple route from Globe to the Salt River would have been to go down Pinal Creek to Wheatfields, which is located just above the point where the canyon boxes up. From here a traveler only would have to go over a low pass to the east and then follow a northeastern flowing arroyo to the Salt River, opposite the mouth of Cherry Creek. At this point, except when the river is high during the spring thaws, one can easily ford the Salt River.

Given this route, it would seem that the ruin of Chichilticale would be one of the other large mounds on the north side of the Salt, now covered by Roosevelt Dam (Schroeder 1955: 285) or perhaps specifically a ruin a small distance downriver and across the Salt from the mouth of Pinal Creek (Potter 1908: 273). In such a case, also, the "Sierra of Chichilticale" would be the Sierra Ancha and the "Pass of Chichilticale" in the same range. Continuing on north, the Coronado party might have gone "up Salome Creek and over the north end of the Sierra Anchas and then generally northeast over the Mogollon Rim across to Zuni" (Schroeder 1956: 32). At any rate this seems to fit the chronicle evidence better than the alternative route proposed by Bolton (1964: 109-10) which had the group crossing the Salt River at about the mouth of Bonita Creek and continuing northward into the Fort Apache and White River areas to the Mogollon Rim, in part following the route of the modern Arizona State Highway 73.

If the Pinal-Salt-Salome route is correct, the Indians encountered in the Chichilticale area were probably Yavapai as Schroeder (1956: 33) has suggested.

Chichilticale east. In a recent publication (Riley 1982: 10, fig. 4, 11, fig. 5) I accepted Schroeder's placement of Chichilticale and routing of Coronado as one alternative, but mapped a second routing with Chichilticale located some 240 km to the east.

If I were to postulate an eastern route, I would have the Coronado party swing through the edge of Mimbres country—eventually crossing the Gila somewhere around Cliff and roughly following the route of modern U.S. Highway 180 to the region of Luna—then either northward to Zuni or more likely northwestward into the Little Colorado drainage ...

(Riley 1982: 63).

This route or some variation on it has a number of things in its favor. For the most part it is an easier route, taking advantage of wide areas of relatively flat land, but with mountains near enough for fodder and water. An eastern location of Chichilticale and an eastern route for Coronado would explain the curious lack of information that Coronado had concerning native
FIGURE 1 — ALTERNATE LOCATIONS OF CHICHILTICALE

Coronado Route via Chichilticale west
Coronado Route via Chichilticale east
Alternate Route up Yacqui Valley

- Chichilticale west

- Chichilticale east
populations in the Gila-Salt area, compared to Marcos whose information is relatively detailed. This would, of course, indicate that Coronado and Marcos followed different trails not only in the Mexican portion of their trips but in the American portions as well. In such a case, Marcos presumably never saw Chichilticale in 1539, visiting it for the first time as part of the Coronado party in 1540. This does make Coronado's statement in his letter to the viceroy dated August 3, 1540 (Hammond and Rey 1940: 165), difficult to explain for Coronado stated that Marcos had given him specific information on Chichilticale that proved to be false. The information (that the sea was only five leagues distant at Chichilticale and that there was a "Port" of Chichilticale) did not appear, of course, in the Marcos report, and Undreiner (1947: 459) doubted that Marcos ever gave such information to Coronado. This may well have been the case especially since the Coronado letter to Mendoza that gave these data is known only from an Italian text of Ramusio (1556) and may well be corrupt. Still and all, reading such evidence as we do have, it is hard to believe that Marcos had not at least heard of Chichilticale in 1539. "Heard," in fact, may be the operative word. If one assumes that Marcos did not get all the way to Cibola and actually described it from hearsay, the same may be true of Chichilticale. Such a situation does suggest that Chichilticale was an important native landmark on the road to Cibola.

If the Chichilticale east location is correct, the area would have actually been first seen by the Díaz party in the winter of 1539. Both the latter explorer and the two main Coronado parties likely came up the Sonora Valley, and then northeastward to the Agua Prieta area. A route (first suggested by DiPeso) up the San Bernardino then following the line of modern route 80 into the Animas Valley seems most logical. However, rather than swinging westward into the tangled mountains of the San Francisco and Blue rivers, I think Coronado may have followed the relatively easy terrain now used by Route 180, perhaps reaching the Gila somewhere in the Cliff area. Chichilticale may have been one of the Salado or Cliff Phase ruins in that region. As he went north, Coronado would have been in or near stands of ponderosa and piñon as described by Castañeda. The Sierra of Chichilticale might then be the Mogollon Mountains. DiPeso had the party continuing up the New Mexico side of the present state boundary, but it is hard to believe that Carrizo Wash could have been the Bermejo River of the Spaniards. I would rather think that Coronado, following a well-marked native trail with native guides, recrossed the border and came out in the upland valleys in the area around present-day Alpine. From there the route ran northward up the headwaters of the Little Colorado and on to the Zuni. The trail across the San Francisco Mountains would admittedly be rough but there is no way in which Coronado can be routed that does not offer serious terrain difficulties at one point or another.

If Chichilticale was in the upper Gila drainage, the barbarous Indians were not likely to have been Yavapai. In such a case, I suggest that early groups of Apache may have been involved. I realize some scholars hesitate to believe that the Apache were as far south and west as the Arizona-New Mexico border area in 1540 but based on documentation from the slightly later Espejo expedition, I have suggested that Apache and perhaps even Navajo were in western New Mexico and eastern Arizona by Coronado's

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Clearly the search for Chichilticale is not yet over. I have given what I think to be the two most promising candidates for this enigmatic ruin-mountain pass-range. On the basis of present-day evidence, the case for Chichilticale made by Potter and Schroeder would seem to be stronger, but the last word is by no means in.

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NOTES

1 Figure 1 is adapted and modified from Riley 1982: 10, fig. 4. The base map was drawn by Karen A. Schmidt and the Coronado routes and Chichilticale locations were prepared by Joni L. Manson specifically for this paper.

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INTRODUCTION

A re-examination of Hodge's theory identifying Marcos de Niza's and Coronado's "Cibola" as Hawikuh reveals various fallacies. Each argument is discussed in the light of both the documents and the terrain. As a result, much of the evidence is discovered to point to Kiakima, especially in Fray Marcos' case. It is suggested that Hodge did not prove his theory and that the present acceptance of Hawikuh should be discontinued pending further investigation.

In the year 1539 a Franciscan friar, known to history as Fray Marcos de Niza, set out on orders from Viceroy Antonio de Mendoza, in search of a legendary "seven cities" reported to be in the North. The pueblos that he found and reported on in his Relación have been identified by scholars as the now ruined villages in the Zuñi region of New Mexico. The Coronado expedition was sent a year later to follow up on his discovery.

Fray Marcos was accompanied on his quest by a black slave from North Africa, Estevan, a veteran of Cabeza de Vaca's odyssey across the southern lands to Culiacán, after the disastrous shipwreck of the Pánfilo de Narváez fleet on the west coast of Florida in 1526. Fray Marcos dispatched Estevan on ahead to scout out routes and acquire information. The Negro sent back word that he was in fact on the track of a fabulous city called "Cibola," but before Fray Marcos could overtake him, Estevan arrived at the pueblo and was killed by the inhabitants. Marcos pushed on nevertheless and, according to his report, viewed the town only from a distance lest he too be killed and the information lost to the viceroy who had sent him (Pacheco: III, 348). He described it thus:

It is built in a flat area on the slope of a round height; it is very handsome; it is the largest that I have seen in these parts. Having climbed a height from whence I could observe it I saw that the houses were built as the Indians had told me: all of stone, with several floors, and surmounted by terraces. This city is more extensive than that of Mexico...Having told the chiefs who accompanied me that I found this city very beautiful, they assured me that it was the smallest of the seven cities.

Though there is no other proof than Fray Marcos' word that he actually saw such a village (he has been branded a liar by certain scholars —Hallenback 1949; Sauer 1932, 1937, 1941), there seems to be no reason to assume that he was not telling the truth as he saw it. But which of the Zuñi pueblos might he have seen?

Over the years much has been written about this expedition. The identification of these pueblos led to further speculation as to which one Fray Marcos described. Six have been located: Matsaki, Hawikuh, Kiakima, Halona, Kechipawa, and Kwakina. The existence of a seventh is still uncertain.

Frederick W. Hodge, the eminent archaeologist who did extensive work at Hawikuh, took up the matter in great detail both in his article, "The First Discovered City of Cibola" and in his later book The History of Hawikuh. He contended that Hawikuh was the Cibola of Fray Marcos.

Before him, early writers had
Figure 1. Zuni, N.M. showing location of archaeological sites.

Figure 2. General topography in the vicinity of Hawikuh.
Figure 3. General topography in the vicinity of Kiakima.

prepared by Juel Rodack from U.S.G.S. topographic maps

General topography in the vicinity of KIAKIMA

Scale in miles

| 0 | 10 |

Scale in kilometers

| 0 | 10 |
considered the subject. J. H. Simpson had suggested very early on that it was one of the groups of ruins atop the mesa of Dowa Yalanne that looms up on the Zuñi Plain. However, in no way could Fray Marcos have viewed a pueblo in such a location. Halona was suggested by W. H. Davis. This stood nearly on the site of present-day Zuñi and could hardly be considered as occupying a "height." Adolph Bandelier, on the other hand, firmly believed that the pueblo in question was Kiakima (Bandelier 1887: 193-194; 1981: 95-96). This theory was in fact supported by a Zuñi legend told to Bandelier by his friend Frank Hamilton Cushing who spent much time among the Zuñi. This legend stated that a "black Mexican" was killed at "Kia-ki-mé."

Hodge's theory has, for some reason, become rather universally accepted by scholars. The names "Cibola" and "Hawikuh" are often used synonymously, and the matter has seemed to be closed. However, upon closer study of Fray Marcos' Relación, the Coronado documents and others, several questions arise that are not easily answered by the Hawikuh theory. An on-site examination of the area supports this doubt.

Hodge started from the premise that Fray Marcos' "Cibola" and Coronado's were identical. He considered them, therefore, as a single unit. The evidence concerning Coronado's expedition must indeed be analyzed in conjunction with that relating to Fray Marcos. Nevertheless, Hodge's arguments, as well as other points that he overlooked, should be examined more closely before any sweeping acceptance of Hawikuh as either town can become historical law.

Let us first consider the identity of the village Fray Marcos saw:

1. Hodge stated that Fray Marcos must have traveled along a regular trade route. These usually followed river valleys where there was water, in this case, the Zuñi River Valley. Hawikuh would then have been the "first city" encountered. Any other route would be "tortuous," as well as "dreary and rugged." Hodge also claimed that when Fray Marcos said "I followed my road," this meant the road he was on, namely, the only road (Hodge 1885: 146).

It is true that this might seem a natural route, but does not mean that it was the only one. The land south of Zuñi is a high plateau cut by canyons that lead northward down onto the Zuñi Plain. Fray Marcos might have approached from this southern plateau and descended into Galestina Canyon or Mullen Canyon, either of which leads directly to Kiakima. The Indians would have known of the springs along the way, and being on foot, they had no animals, so a minimum of water would have been required.

Though Hodge had no use for Indian tradition, as we shall presently see, the story of the "Black Mexican" as told by the Zuñi, mentioned that "they" came out of "Hemlock Canyon" and descended to Kia-ki-mé." To date no informant at Zuñi has been able to identify this canyon, but all have said that both Galestina and Mullen Canyons are passable, though rugged, and can be traveled. The writer has explored them to some extent.

As for Fray Marcos' statement that "I followed my road," this obviously meant merely that he continued on his way, certainly not implying that there were no other roads!

2. Fray Marcos described Cibola as being "in a plain at the slope of a round hill" (Hodge's translation: 1895: 146). He did in fact add, "It looks very handsome. It is the largest that I have seen in these parts." Hodge claimed that this described Hawikuh, quoting archaeologist Victor Mindeleff (Hodge 1895: 147) who said that the village was "occupying the point of a spur projecting from a low rounded
Hill" (Mindeleff 1891: 80). Hodge said that Hawikuh commanded a view in all directions, rising from the plain and could thus be described as "handsome," whereas Kiakima was on an "inconvenient knoll of talus and cowering under the protection of old T'aiyalone [Dowa Yalanne]."

The first clue to Cibola's location is, of course, "in a plain at the slope of a round hill." The Spanish reads: "en un llano a la falda de un cerro redondo." This has been variously translated. "Llano" can mean "plain." It also describes any flat area. "A la falda" usually means "on the (lower) slope." Finally, "cerro" is often called a "hill," as here. However, the consultation of a few dictionaries is enlightening. One described "cerro" as "Elevación del terreno, de poca extensión pero de considerable altura con relación a ella, escarpada, de tierra o rocosa." [A rise of land, not very extensive but of considerable elevation in proportion to its area, steep, of earth or rocks. Moliner.] Another: "Altura de tierra comúnmente peñascosa y áspera." [A usually rocky - or craggy - and steep height. Toro y Gómez.] Or: "Elevación de tierra aislada y de menor altura que el monte o la montaña." [An isolated height, lower than a monte or a mountain. Real Academia.] However, it should in all fairness be pointed out that Fray Marcos also used the word "cerro" to describe the height that he climbed from which to view Cibola and which may not have been so very high. But this could well have been the lower escarpments of a higher mesa.

Hawikuh is located on a spur or ridge, which might qualify as a hill, but rises only about 60 feet above the valley floor. It is somewhat rounded but not rocky or craggy. It is not round but long and narrow. It does stand in a plain, projecting far out from a higher elevation which is not round and to which it almost seems unrelated. This elevation is merely the high point of the land sloping up from the west, which then drops off abruptly to the east. From a distance, viewed from the west or southwest, the ridge on which Hawikuh stands blends so completely into the surrounding plain that it is hardly visible.

Fray Marcos said he climbed a height in order to view Cibola. There is no such height in the direction of the Zuñi River. The entire plain slopes gradually up the the south, but there is nothing to "climb" nor could it be called a "cerro." The only "heights" are to the east and north and Marcos would have had to make a broad circle around the pueblo to reach them. His fear of being seen makes this unlikely.

Kiakima stands on a flat, though slightly rounded talus bank on the side of Dowa Yalanne. This mesa is generally oval in shape and rises about 600 feet above broad valleys. Hodge said that it did not appear round from any direction (1895: 147), but from some angles it does in fact appear so. Dowa Yalanne is definitely an isolated elevation, very craggy and rocky. Thus, it seems that Kiakima qualifies far better than Hawikuh. The ruins stand in a flat area, low on the side of an impressive "cerro" roundish in contour.

Incidently, Hodge quoted Victor Mindeleff, as mentioned above (Mindeleff 1891: 80), but he selected only the quote that supported his theory. Mindeleff said elsewhere that Kiakima occupied "a high rounded spur of foothills" on the south side of Dowa Yalanne (Mindeleff 1891: 85).

Fray Marcos was struck by the beauty of the pueblo. Contrary to Hodge's impression, the setting of Kiakima is certainly more striking and picturesque than that of Hawikuh. Approaching from Mullen Canyon, in fact, the site is almost breathtaking at certain hours of the day.

3. Fray Marcos stated that Cibola was larger than Mexico City. Hodge considered this comparison ri-
diculous (1895: 147). However, since Hawikuh stands in a plain, he said, it might look larger, not being overshadowed by the large mesa as is Kiakima. He pointed out that Hawikuh was in fact larger than Kiakima.

To compare Kiakima, or any of these pueblos, to Mexico City might indeed seem an exaggeration. However, immediately above it rise columnar cliffs of red sandstone that might be mistaken from a distance for additional tall buildings. Bandelier went to some trouble to analyze the comparison (1887: 195-196; 1976: 172; 1981: 100-101). He pointed out that the capital was not large in those days. In 1539 it was the new, still small town built on the ruins of Tenochtitlan. A description of it a few years later showed the native huts as almost invisible among the European dwellings (Cervantes de Salazar 1953: 271v), so Fray Marcos would have thought of the capital's appearance in terms of the Spanish area only, which, said Bandelier, had only about 1,500 souls in 1556. In 1539 it must have had even less. A good sized Indian pueblo could appear nearly that large. He also mentioned that the terraced houses would make it seem larger than it was.

How large were Hawikuh and Kiakima in actual fact? Fray Marcos' Indian companions had told him that Cibola was the smallest. Hodge dismissed this as "braggadocio" (1895: 148). But, while they may have wanted to impress the friar, it is likely that there was some truth in their statement. Though not the smallest, the implication was that Cibola was not the largest either. This was supported by an Indian from Cibola whom Marcos had met earlier (Hammond-Rey 1940: 72; Pacheco III: 340). This man also stated that some of the cities were indeed even larger and Ahacus was the principal one. Hodge identified Ahacus as Hawikuh (1937: 57). So, if Ahacus (Hawikuh) was the principal city and thus presumably larger than Cibola, then Cibola could not have been Hawikuh.

The documents disagree on the size of the villages. Hernán Gallegos, with the Chamusseau expedition in 1581, said that Aquima (Kiakima) then had 75 houses, Maça (Matsaki) 100, and Aguico (Hawikuh) 125. Alonagua (Halona) had only 44 houses, and another unnamed pueblo had 54 (Hammond-Rey 1966: 108). Additional notes also included Coaguina (Kwakina) with 60 houses, and Acona (Kechipawa) with 40 (Hammond-Rey 1966: 120). Note that Kiakima is third in line and larger even than Halona.

The "Relación del Suceso," contemporary with Coronado, referred vaguely to "seven pueblos" of 300, 200 and 150 houses each (Hammond-Rey 1940: 285). The "Relación postrera de Cibola," also of that period, stated that Cibola had 200 houses (Hammond-Rey 1940: 308-309). Farther on it added that "in the province of Cibola," the "largest" pueblo had 200 as did two others (which still must have been slightly smaller if there was a "largest") and the rest had 60, 50, and 30 houses respectively. This implies that there were three large pueblos. Hodge assumed rather gratuitously that these were Halona, Hawikuh, and Matsaki (Hodge 1895: 148), whereas in actual fact the "Postrera" made no such statement. He tried to relate its figures to Vetancurt's mention (Hodge 1895: 148; Vetancurt 1961: 275), in the 1670s, of Halona and Hawikuh as the principal pueblos, thus presumably the largest, but this was nearly a century and a half after Coronado and could hardly have described the pueblos of 1539-40.

Finally, Coronado himself said that the whole group was called "Cibola," but that his village has 200 houses (Hammond-Rey 1940: 170-171), with perhaps 500 "hearths" or "families" in all the pueblos together. Castañeda merely said that Matsaki was the
Figure 4. General view of vicinity of Hawikuh as seen from the south. Ruins lie on end of small ridge in center. Ridge in distance is formed by land rising gradually from west.

Figure 5. Site of Hawikuh as seen from the south. Ruins lie on the slope and crest of hill at right. Lowest structures date from after Fray Marcos' time.
The only conclusions that can be drawn from all this is that Hawikuh and Matsaki were probably larger than the others, but that Kiakima (rather than Halona — see Gallegos above) was at least a large third (see "Relación Postrrera" above). Unfortunately, only Hawikuh has been excavated to any degree. Watson Smith, in his discussion of Hodge's work at this pueblo, said that about 500 rooms were probably occupied at one time (Smith, et al. 1966: 12). A recent site study done at Kiakima (Ferguson, et al. 1977: 37) stated that the portion of that village existing in 1539-40 might have had from 400 to 600 rooms. In other words, it was one of the larger pueblos. Though smaller than Ahacus, it still appeared large enough to be as comparable to Mexico City as was Hawikuh.

4. Hodge pointed out that the documents constantly referred to buildings several stories high. He said that rubble at Hawikuh showed that these houses were multi-storied, whereas at Kiakima this was not so according to estimates given him by Cosmos Mindeleff (Hodge 1895: 147).

Mindeleff based his opinion on a survey of the site only. The recent study also examined the walls and rubble and reported that it was apparent that many of the houses were probably at least two and possibly three stories high (Ferguson, et al. 1977: 17, 28, 37). This difference was quite likely the result of more modern survey methods. The study referred to Kiakima as "a most impressive ruin" (pp. 15, 71).

Hodge stated that Fray Marcos saw only one village. At Kiakima, he said, both Halona and probably Matsaki would have been visible (Hodge 1895: 148). He referred to Victor Mindeleff's photograph of Dowa Yalanne (Mindeleff 1891: 126) taken from Zuñi (Halona) which included both Matsaki and Kiakima. Hawikuh, on the other hand, had no nearby village visible.

It is true that no other village was visible from Hawikuh. It is also true that Kiakima and Matsaki may have been partially seen from Halona. However, Fray Marcos was not at Halona. If the friar approached from Galestina Canyon and climbed a height at the base of the cliffs opposite Kiakima, the other villages would have been hidden by the projecting end of Dowa Yalanne and a high ridge that cuts across the valley. Even more so, approaching from Mullen Canyon, Kiakima would have spread out in all its glory, whereas Halona would have been hidden by this same ridge, and Matsaki, by a strange cluster known as the Badger Hills.

6. An Indian who escaped when Estevan was killed reported to Fray Marcos that his good luck was due to the fact that he had left the house where Estevan and his followers had been kept overnight, to go drink in a stream that ran nearby. From there he saw the massacre of Estevan and the others, after which he crossed the river and went upstream to join the trail leading back to Fray Marcos (Hammond-Rey 1940: 76; Pacheco III: 344). Hodge said that this stream undoubtedly was one of the irrigation canals near Hawikuh mentioned by Luxán, a member of Espejo's expedition in 1582 (Hammond-Rey 1966: 186; Hodge 1937: 111n32).

There are still irrigation ditches near Hawikuh, as well as a narrow arroyo. In the sixteenth century there was probably more water in all the drainages than now, in view of expedition reports on the volume of the rivers. However, a stream bed lies in the valley below Kiakima. It leads out of Galestina Canyon to the Zuñi River and, though it is often dry, some water was observed in it in September 1981 when the writer of this study examined the site. In Fray Marcos' time there was probably more. If the Indian was referring either to the nar-
Figure 6. Site of Kiakima. The ruins lie on the rounded slope at foot of cliffs in center of picture.

Figure 7. The site of Kiakima as seen from the heights opposite, when approaching from Mullen Canyon. The ruins are on the low mound at base of mountain in center of picture.
Figure 8. Dowa Yalanne as seen when approaching from Galestina Canyon. Kiakima is as yet invisible, but lies at the base of the mesa just out of sight at far left. Note grass for forage in foreground.

Figure 9. Dowa Yalanne as seen from the heights opposite when approaching from Galestina Canyon. Kiakima is at the base of the notch at far left.
row arroyo or to the Zuni River he would have had to go downstream to join the friar, and would not have "crossed" the river. On the other hand, at Kiakima, he would have been traveling upstream in Galestina Canyon and would have had to cross it to reach the trail leading southwest.

From Kiakima he might also have gone up Mullen Canyon. Here, however, the arroyo today disappears in the plain before joining the main stream from Galestina Canyon. But in 1539 it may well have flowed into the arroyo below Kiakima and would have afforded an upstream route back to the trail, including a crossing.

7. Hodge, in a sort of negative argument (1895: 152) claimed that Kiakima could not have been Fray Marcos' Cibola because a story that Bandelier told of a wooden cross still standing only a few years previous on the heights opposite that pueblo was incredible. Hodge scoffed at this as a product of the imagination, or else a marker of some traveler's death. He was probably correct that a wooden cross would not last that long. This cross, erected by Marcos to claim possession for the King of Spain, was undoubtedly crudely made of available twigs and branches. Bandelier himself admitted that the supposition was unlikely, but still "not wholly to be rejected" (1893: 160). Hodge believed that the idea was inserted by the editor of The Gilded Man, in which it appeared, since he said Bandelier mentioned it nowhere else. In this he was wrong, for Bandelier did tell of the cross in his article of 1886 in the Revue d'Ethnographie (1981: 96), as well as in his journal entry of March 1, 1883 (Lange-Riley 1970: 47). Of course Hodge never saw these references. In any case, even if he was right about the cross, this was no proof that Kiakima was not Cibola.

8. Hodge went to great lengths to discredit Indian tradition. The story that Estevan was killed at Kiakima he considered unworthy of trust. Hodge, who worked several seasons with the Zuni at Hawikuh might have known that an Indian legend is often symbolic and rarely factual in our sense of the word. This one, as told by Cushing, who quoted the words of a Zuni friend, reads as follows:

It is to be believed that a long time ago, when roofs lay over the walls of Kia-ki-mé, when smoke hung over the house tops, and the ladder-rounds were still unbroken in Kia-ki-mé, then the Black Mexicans came from their abodes in Everlasting Summer-land. One day, unexpectedly, out of Hemlock Canyon they came and descended to Kia-ki-mé. But when they said they would enter the covered way, it seems that our ancients looked not gently at them, for with these Black Mexicans came many Indians of So-no-li, as they call it now, who carried war feathers and long bows and cane arrows like the Apaches, who were the enemies of our ancients; therefore these our ancients, being always bad tempered and quick to anger, made fools of themselves after their fashion, rushed into their town and out of their town, shouting, skipping and shooting with sling-stones and arrows and tossing their war clubs. Then the Indians of So-no-li set up a great howl, and thus they and our ancients did much ill to one another. Then and thus, was killed by our ancients, right where the stone stands down by the arroyo of Kia-ki-mé, one of the Black Mexicans, a large man with Chilli lips, and some of the Indians they killed, catching others. Then the rest ran away, chased by our grandfathers, and went back toward their country in the land of Everlasting Summer....
The legend went on to tell of the return of these Mexicans with "coats of iron" and "war-bonnets of metal," and "canes that spit fire," who then treated the ancients like "slave-creatures" (Cushing 1885 MS).

There seems to be no reason to shrug this legend off in a cavalier fashion as did Hodge. It referred clearly to a "stone" near which the "man with Chili lips" (Estevan) was killed, and there is indeed an immense rock which stands by the arroyo that emerges from a cleft in the mountain, from which a spring flows. It is now at the bend of the tribal road that passes the site and has fallen over due to erosion of the banks.

The fact that they killed some Indians and caught others agrees with the documentary information: Coronado mentioned a boy found in the area (Hammond-Rey 1940: 178) and eventually returned by the Cibolans. Those who escaped fled toward the land of Everlasting Summer (the South). Note also that the "Black Mexicans" descended to Kiakima, as they would have done if coming from any of the southern canyons.

Hodge quoted another legend also (1895: 149) relating how the wise men kicked the stranger out during the night, back to the south from whence he came. He said that this represented a contortion of the tradition by its own authors, making all Zuñi traditions unreliable. It was, however, merely a more fanciful version of the same story. Hodge even claimed that, since Estevan was reportedly killed in the morning, this mention of night made it untrue. But early morning might well be considered "during the night"!

Oral tradition is the Indians' form of history and should no more be discarded than our own historical documents which, as we can see in the case of "Cibola," can be quite vague!

Hodge gave as an example of the unreliability of Zuñi tradition the fact that one story seemed to refer to a visit by Alvar Núñez Cabeza de Vaca. Bandelier said that according to Cushing this man was called Nué (Bandelier 1981: 94–95) which does sound like Núñez. But Hodge concluded that the story was false since Cabeza de Vaca never got that far north (Hodge 1895: 150). However, another white man may well have wandered through the area prior to Fray Marcos, and never returned to tell of it. This hardly proves the unreliability of Zuñi tradition.

Finally, Hodge's parting shot was that, though Niza was a "man of truth ... the many groundless assertions of the Indians as recorded throughout this [the Relación] and subsequent narratives speak for themselves." He did not specify what they were, but noted that "It will be remembered that the Quivira delusion was due to misrepresentations of the Indian Bigotes" (Hodge 1895: 148). This was incorrect. It was not Bigotes, but the "Turk" who spoke in glowing terms of a distant Quivira and later confessed to Coronado that this was part of a plot to lead the Spaniards astray. The story was devised deliberately for a specific purpose and in no way implied that Indians customarily misrepresented such details.

Hodge also tried to show that Indian traditions were not authentic but only came from Spanish influence. He claimed that the Mindeleffs discovered that the Indians only knew the Spanish version of the story. But if both versions agreed with the facts, why should they be different? The Indians would tell it, however, in their own style. The reference to "Kia-ki-mé" did not come from any known Spanish version. It seems more logical to admit that the tradition was authentically Indian, and that the Zuñi had their own sources concerning Estevan's death.

9. Hodge chose not to bring up the matter of the location of the "ruler" of the so-called seven cities. The man from Cibola whom Fray
Marcos had met told him that Ahacus was the principal city of the group and the residence of the "lord" of them all (Hammond-Rey 1940: 72; Pacheco III: 340). The informant said that he was fleeing from "the person whom the ruler had appointed in Cibola," implying that Cibola was not Ahacus where the chief lived. This theory was supported by Estevan's followers whom Fray Marcos encountered as they fled Cibola. They told of how Estevan had sent his gourd ahead to Cibola with messengers to announce his coming and they presented it to "the man appointed there by the ruler" (Hammond-Rey 1940: 75; Pacheco III: 344). Thus Cibola was not the home of the overall ruler, a place previously identified as Ahacus (Hawikuh).

The analysis of all these points shows that Hodge's theory, as to Fray Marcos at least, is clearly open to question. The evidence points definitely to Kiakima. It is therefore suggested that Kiakima, not Hawikuh, was Fray Marcos' "Cibola."

The Coronado and later documents may indeed have related to the matter if it is accepted that Coronado went to the same place. The evidence would seem to point to this in view of the statement by Juan Jaramillo, Coronado's captain, that "Estebanillo" was killed at the "first pueblo of Cibola" (Hammond-Rey 1940: 298). Hodge claimed that Jaramillo said that this happened at Hawikuh, but he said nothing of the kind. However, the statement did imply that this "first" pueblo was the same for both expeditions.

On the assumption that they did go to the same place it is important to take a look at still other statements concerning the Coronado expedition.

1. Coronado named Cibola "Granada," not only to honor the viceroy, a native of the one in Spain, but because it resembled the Albaicín district in the Spanish Granada (Hammond-Rey 1940: 180). Granada is noted for its mountainous setting, the Albaicín in particular being characterized by cliffs famous for caves where gypsies still live today. While the resemblance takes some imagination, the site of Kiakima resembles Granada far more than does that of Hawikuh.

2. The unofficial historian of the Coronado expedition, Pedro de Castañeda, described Cibola as "rocky" and "all crumpled up" (Hammond-Rey 1940: 208). The Kiakima location is far more rocky. The compact style of any Indian pueblo might make it seem "all crumpled up," but, situated on a low ridge in an open area, Hawikuh would have looked less so than Kiakima built against the perpendicular walls of Dowa Yalanne.

3. Coronado had to fight his way into Cibola through a "narrow and winding" entrance (Hammond-Rey 1940: 208). Hodge discovered at Hawikuh a covered passageway obscured by rooms built over it later. It may have led from outside into the main plaza. But Hodge himself admitted that he had not determined its real purpose, and there is no certainty that this was an actual entrance into the town (Smith, et al. 1966: 69-71).

Kiakima, according to the site study, also had a narrow entrance into the main plaza (Ferguson, et al. 1977: 27). Also, the very site of Kiakima implies a narrow approach through the cleft penetrating the side of Dowa Yalanne. One access to the plaza seems in fact to approach from that angle. This could be the "covered way" of the Indian legend.

4. Hodge pointed out (1937: 51) that Coronado referred to a spring nearby. There is such a spring at Ojo Caliente about a mile or so from Hawikuh (Hammond-Rey 1940: 177). But Kiakima also has its spring!

5. Coronado referred to the availability of good grass and pasture about a quarter of a league away (Hammond-Rey 1940: 172). Hodge said that there was such grass at Ojo
Caliente near Hawikuh (Hodge 1937: 43). This is correct. However, another source of good grass might have existed equally close to Kiakima. Grass grows today in Galestina Canyon and both canyons are more lush than the surrounding desert.

6. Coronado said of the Cibola area that the "country is all level and is nowhere shut in by high mountains, although there are some hills and rough passages" (Hammond-Rey 1940: 172). Castañeda said it was "a valley between sierras that rise like boulders (a manera de peñones)" (Hammond-Rey 1940: 252; Winship 1896: 450). Hodge applied both descriptions to Hawikuh. However, Coronado was undoubtedly speaking of the whole Zuñi Plain. Castañeda's description applied to Kiakima far better than it did Hawikuh. It does indeed lie in a valley between "sierras" that stick up like rocks, whereas around Hawikuh the land is quite open.

7. The "Traslado de las Nuevas" mentioned (Hammond-Rey 1940: 181) that on July 19 Coronado went "four leagues from the city to inspect a rock where they told him the Indians of this province were offering resistance (se hacían fuertes), and he returned the same day, traveling eight leagues in going and coming" (Pacheco XIX: 532). Hodge stated (1895:151) that this would have to have been Kiakima which is about 15 miles from Hawikuh and the only place where there is a "rock" (Spanish: peñol). This would, however, be rather a fast trip if he spent any time at all at his destination! The same document mentioned that Coronado arrived at Cibola on July 7, and in his letter to Mendoza (Hammond-Rey 1940: 174) the leader said that he traveled to a city, previously referred to a "larger than this," about twelve or fourteen days after he arrived. This could have been the same journey. If Coronado went from Hawikuh to Kiakima he would not have been going to a "larger" city. If he went to Hawikuh, this is hardly a "rock." Perhaps he went to Matsaki, which was within close view of Dowa Yalanne and which was possibly larger than Hawikuh, but which was not as much as four leagues distant from Kiakima. But perhaps the journeys were not the same, and the "rock" was not at a city at all!

8. Hodge quoted Castañeda (Hodge 1937: 42; Hammond-Rey 1940: 222) as saying that, leaving Cibola the army camped the first night at "the best, largest, and finest village of that province." This might have been Matsaki, which Castañeda called the largest. The 13 miles from Hawikuh to Matsaki would have been a normal day's march. But Jaramillo referred to "a short day's journey," and Kiakima is much closer to Matsaki (Hammond-Rey 1940: 299). If Coronado's camp was at Kiakima, they would have had to go around Dowa Yalanne and enter the Zuñi River Valley at Matsaki. This seems out of the way, but Hodge admitted that Matsaki "was the first pueblo usually reached in journeying from the east" (Hodge 1937: 117n134). Espejo's expedition also referred to Matsaki as the "first" pueblo traveling westward from Acoma (Hammond-Rey 1966: 183).

9. Coronado stated that Estevan was killed "here," because "many of the things he wore have been found, and the Indians say they killed him here" (Hammond-Rey 1940: 177); that is, wherever Coronado was. But where that was is what we are now trying to discover. Also, the word "here" may simply have meant "at Cibola," and Coronado had earlier referred to Cibola as a group of towns (Hammond-Rey 1940: 170).

10. Luxán, accompanying Espejo, said that Mexican Indians who had come with Coronado were discovered "here" as well as a book and a trunk. But again, where was "here"? The quote is:
We found very well-built crosses in all these pueblos [just listed as Mazaque, Quaquema, Aguico, Alona, Quauauina and Cana] ... because Coronado had been in this region, as the natives told us everywhere. Here we found Mexican Indians, and also a number from Guadalajara, some of those that Coronado had brought... Here also we found a book and a small old trunk left by Coronado (Hammond-Rey 1966: 184).

So "here" seems merely to have referred to as "this region."

11. Espejo himself wrote about finding the Mexican Indians at Zuñi but mentioned no specific town. He merely said that they arrived in a province "known as Zuñi, or Cíbola... which we learned had been visited by Francisco Vázquez Coronado and some captains who accompanied him... here we found three Christian Indians... who said they had come to the land with Governor Francisco Vázquez Coronado" (Hammond-Rey 1966: 225). There was no evidence in either this narrative or the previous one that would pinpoint any one village as the place in question.

12. At the end of the century, Juan de Oñate approached Zuñi from the east and made two references to this journey. In one instance he said that, after arriving at "the first pueblo in the province of Zuñi," they proceeded on the the "last" village of Zuñi which he said was called Cíbola or Granada, and mentioned that this was where Coronado had the skirmish with the Indians. He then said that the descendants of the Indians left by Coronado had remained "there" (Hammond-Rey 1953: 394-395).

In another passage, however, it was reported that his expedition traveled "to the first pueblo of Zuñi" and that "at that place descendants of the Mexican Indians left there by Coronado were found" (Hammond-Rey 1953: 327). The first pueblo coming from the east would be either Matsaki or Kiakima, depending on the route — but certainly not Hawikuh, which would be the last one met when moving westward.

So first the skirmish and the Indians' descendants are in the "last" pueblo and then, later, the Indians in the "first" pueblo. This makes both statements suspect. The matter may only be partially resolved by assuming some confusion on Oñate's part about the name of "Cíbola." Applied to the whole group by Coronado, it could have come to be applied over the years to only the one (Hawikuh), since the others had appreciably diminished in size and importance. The name "Granada," as well as the skirmish, were both associated with "Cíbola." Hence the confusion.

13. Hodge also quoted Francisco de Escobar (Hodge 1937: 76-77), who accompanied Oñate. This narrator said that, though most of the Zuñi pueblos were partially destroyed by then (1604), "the largest and chief one is called by the Spaniards Scibola, and the Indians know it by this name, although in their own language it is called Havico" (Escobar 1966: 25). The same argument as above applies here. Hawikuh was by then the main pueblo and the others were falling into decay. Escobar in fact added: "And all the pueblos together contain less than three hundred inhabited houses" (Escobar: 25), implying that the other villages must have been quite insignificant by then. So Oñate's "Cíbola" was not necessarily Coronado's.

The identity of Coronado's "Granada" is obviously clouded in conflicting statements. But in no way did Hodge actually prove that the village in question was Hawikuh. Fewer pieces of the jig-saw puzzle seem to be left over when "Granada" is identified as Kiakima, but there are many discrepancies. The question of Fray Marcos is much clearer. The topog-
raphy alone favors Kiakima as his "Cibola," hence probably Coronado's.

Instead of accepting as an established fact that Hawikuh is Fray Marcos' and Coronado's "city," scholars would do well to at least keep an open mind. Even in Coronado's case, Kiakima should not be summarily discarded. Hawikuh and Cibola should not be spoken of as synonymous. Enough questions still exist to warrant a new look at the matter. Historians and archaeologists would be wise to investigate the situation further before accepting Hawikuh as positively as they seem to be doing at present. The identity of Cibola has not yet been definitively confirmed.

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In 1834, a comprehensive report on the state of Chihuahua was published (Escudero 1834) in which it was stated that over 2000 Apache Indians were at peace, dwelling at various presidios or forts in northern Mexico (see Chart #1). By the time North Americans began to enter the region in earnest during the United States-Mexican War (1846-1848), they soon learned that the Apaches were the implacable enemies of the Mexicans. These two bodies of information, highly discrepant in themselves, prompt a number of questions: given that both were true, why the shift in frontier relations and how did the change take place? What were the events hidden behind these seemingly contradictory statements on affairs in the borderlands? What does their contrast indicate about the effects such changes may have had on both the Apache and Mexican people? And, how did this earlier phase of Apache history fit in with the overall history of the Apaches as the Anglo-Americans later came to know it?

The information contained in the 1834 report actually referred to conditions that existed during the previous decade, those rather turbulent 10 years following the Independence of Mexico from Spain in 1821. While much more research needs to be done on this era, the names of Apache leaders (and some of the statistics) from one presidio, that of Janos, indicate that these data reflected the situation of about the year 1825 (see Chart #2). Fortunately, this was not the only account of Apaches at peace at Mexican forts. Another one covering the same region in 1821 was comparable, although the specific figures cited were slightly different, and the neighboring state of Sonora to the west was also included. In a report three decades before, in 1793, a picture similar to that of the 1820s was painted (Moorhead 1975: 260-261). Clearly we are dealing with a frontier situation of some duration, although it had changed radically by the time North Americans entered the scene.

A known but little studied or appreciated side of frontier history was the establishment in the late 1700s of a system of peace reserves for Apache Indians, slightly reminiscent of the Indian reservations later instituted in the United States. These so-called peace establishments, establecimientos de paz, were an integral part of a new military policy implemented in the northern borderlands of New Spain at that time. Founded officially in 1786, these establecimientos served as a basic frontier institution for some 70 years, although they became essentially inoperative in 1831. At the same time, this was the only period in north Mexican history that the military, instead of religious orders, had the prime responsibility for the administration of Native Americans.

THE COLONIAL BACKGROUND

The latter part of the colonial period saw a number of reforms in policy on the northern frontier. The events leading up to the founding of the peace establishments were myriad and complex, but their immediate roots are easily traceable back for a century or so. The Pueblo Revolt in New Mexico in 1680, the rebellion, just to the south, of many Nueva Vizcayan (Chihuahua) peoples in 1684, the opening of new mines and settlements, and the intensification of Spanish energies to
<table>
<thead>
<tr>
<th>PRESIDIOS</th>
<th>1793(1)</th>
<th>1821(2)</th>
<th>ca.1825(3)</th>
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<tbody>
<tr>
<td>Nueva Vizcaya</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Janos</td>
<td>408(20%)</td>
<td>442(31%)</td>
<td>410(19%)</td>
</tr>
<tr>
<td>San Buenaventura</td>
<td>---</td>
<td>210(15%)</td>
<td>149(6%)</td>
</tr>
<tr>
<td>Namiquipa</td>
<td>---</td>
<td>---</td>
<td>15(0.6%)</td>
</tr>
<tr>
<td>El Carrizal</td>
<td>254(13%)</td>
<td>347(24%)</td>
<td>280(11%)</td>
</tr>
<tr>
<td>San Eleceario</td>
<td>63(3%)</td>
<td>350(25%)</td>
<td>1202(48%)</td>
</tr>
<tr>
<td>El Norte</td>
<td>est 800(40%)(5)</td>
<td>31(2%)</td>
<td>57(2%)</td>
</tr>
<tr>
<td>El Principe</td>
<td>---</td>
<td>43(3%)</td>
<td>12(0.5%)(6)</td>
</tr>
<tr>
<td>Totals</td>
<td>1525(76%)</td>
<td>1425(100%)</td>
<td>2125(85%)</td>
</tr>
<tr>
<td>Sonora</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bacoachi</td>
<td>81(4%)(7)</td>
<td>---</td>
<td>190(8%)</td>
</tr>
<tr>
<td>Bavispe</td>
<td>---</td>
<td>---</td>
<td>37(1%)</td>
</tr>
<tr>
<td>Fronteras</td>
<td>77(4%)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Tucson</td>
<td>86(4%)</td>
<td>---</td>
<td>144(6%)</td>
</tr>
<tr>
<td>Totals</td>
<td>224(12%)</td>
<td>---</td>
<td>371(15%)</td>
</tr>
<tr>
<td>New Mexico</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sabinal</td>
<td>226(11%)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Total</td>
<td>226(11%)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Grand Totals</td>
<td>1995(100%)</td>
<td>1423(100%)</td>
<td>2496(100%)</td>
</tr>
</tbody>
</table>

Citations
(2) December 6, 1821 (RJ-13: 1821).
(3) Escudero 1934: 232-233. It is unknown from exactly where these figures came or how they were collected; from the names of the chiefs cited, they would seem to refer to about 1825 at Janos, although the totals themselves are at variance with others for this year.
(4) This is an exceptionally large number of Apaches for this presidio which generally, from other references, had a proportion of administered Apaches much more in line with the percentages given for 1821. Only further research will be able to explain this discrepancy.
(5) Moorhead (1975) estimated 800 to 900 Mescalero Apaches at El Norte at this time. This was based on the totals given for the number of warriors, 230-250, multiplied by 3.6 (a ratio of adult males to women and children of 2.6 derived from household averages at other peace establishments at this time. This calculation yielded 828 persons using the 230 figure of 900 using the 250 figure. I have taken the lesser figure and (conservatively) rounded it off to 800 souls.
(6) Cited as Coyame in that year.
(7) Extant figures from Bacoachi for 1792 averaged slightly higher than this: 176 for June, 60 for November, and 88 for December, giving a mean of 108 (Sonora Microfilm Collection).
<table>
<thead>
<tr>
<th>YEAR</th>
<th>AVERAGE(1)</th>
<th>RANGE</th>
<th>FLUCTUATION(2)</th>
<th>REPORT TYPE(3)</th>
</tr>
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<tbody>
<tr>
<td>1792</td>
<td>368</td>
<td>326-453</td>
<td>28%</td>
<td>MC (9) (4)</td>
</tr>
<tr>
<td>1793</td>
<td>453</td>
<td>404-487</td>
<td>17%</td>
<td>MC (9) (5)</td>
</tr>
<tr>
<td>1794</td>
<td>422</td>
<td>275-500</td>
<td>45%</td>
<td>MC12 (6)</td>
</tr>
<tr>
<td>1795</td>
<td>782</td>
<td>616-820</td>
<td>25%</td>
<td>MC12 (7)</td>
</tr>
<tr>
<td>1796</td>
<td>1st 6 mos</td>
<td>738</td>
<td>719-767</td>
<td>6%</td>
</tr>
<tr>
<td></td>
<td>2nd 6 mos</td>
<td>207</td>
<td>181-234</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td>total</td>
<td>472</td>
<td>76%</td>
<td></td>
</tr>
<tr>
<td>1797</td>
<td>174</td>
<td>161-211</td>
<td>24%</td>
<td>MC (5) (9)</td>
</tr>
<tr>
<td>1800</td>
<td>187</td>
<td>77-248</td>
<td>69%</td>
<td>WR(24) (10)</td>
</tr>
<tr>
<td>1801</td>
<td>201</td>
<td>130-247</td>
<td>47%</td>
<td>MC (6) (11)</td>
</tr>
<tr>
<td>1802</td>
<td>296</td>
<td>160-374</td>
<td>57%</td>
<td>MC(12) (12)</td>
</tr>
<tr>
<td>1803</td>
<td>392</td>
<td>377-407</td>
<td>7%</td>
<td>MC (2) (13)</td>
</tr>
<tr>
<td>1810</td>
<td>315</td>
<td>-</td>
<td>-</td>
<td>MC (1) (14)</td>
</tr>
<tr>
<td>1812</td>
<td>350</td>
<td>152-343</td>
<td>56%</td>
<td>WR (8) (15)</td>
</tr>
<tr>
<td>1816</td>
<td>79</td>
<td>30-230</td>
<td>87%</td>
<td>WR(18) (16)</td>
</tr>
<tr>
<td>1818</td>
<td>137</td>
<td>74-224</td>
<td>67%</td>
<td>WR(23) (17)</td>
</tr>
<tr>
<td>1819</td>
<td>224</td>
<td>161-319</td>
<td>50%</td>
<td>WR (7) (18)</td>
</tr>
<tr>
<td>1821</td>
<td>493</td>
<td>-</td>
<td>-</td>
<td>MC (1) (19)</td>
</tr>
<tr>
<td></td>
<td>(plus a general report with 442 persons)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1822</td>
<td>277</td>
<td>153-473</td>
<td>68%</td>
<td>WR(11) (20)</td>
</tr>
<tr>
<td>1824</td>
<td>174</td>
<td>125-258</td>
<td>52%</td>
<td>WR(15) (21)</td>
</tr>
<tr>
<td>1825</td>
<td>103</td>
<td>31-180</td>
<td>83%</td>
<td>WR (4) (22)</td>
</tr>
<tr>
<td>1826</td>
<td>98</td>
<td>13-199</td>
<td>93%</td>
<td>WR(17) (23)</td>
</tr>
<tr>
<td>1827</td>
<td>63</td>
<td>17-159</td>
<td>89%</td>
<td>WR(20) (24)</td>
</tr>
<tr>
<td>1828</td>
<td>117</td>
<td>46-208</td>
<td>78%</td>
<td>WR(22) (25)</td>
</tr>
<tr>
<td>1830</td>
<td>92</td>
<td>57-132</td>
<td>57%</td>
<td>WR(16) (26)</td>
</tr>
<tr>
<td>1831</td>
<td>78</td>
<td>28-135</td>
<td>79%</td>
<td>WR(18) (27)</td>
</tr>
</tbody>
</table>
MEXICAN OFFICIAL CENSUS

<table>
<thead>
<tr>
<th>YEAR</th>
<th>TOTAL</th>
<th>MONTHS REPORTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>1823</td>
<td>556</td>
<td>March (28)</td>
</tr>
<tr>
<td>1825</td>
<td>556</td>
<td>October, November (29), December (30)</td>
</tr>
<tr>
<td>1827</td>
<td>556</td>
<td>January through October (31)</td>
</tr>
<tr>
<td>1828</td>
<td>562</td>
<td>December (32)</td>
</tr>
<tr>
<td>1829</td>
<td>565</td>
<td>January through March, May through August, October (33)</td>
</tr>
<tr>
<td></td>
<td>575</td>
<td>January, March, April</td>
</tr>
<tr>
<td></td>
<td></td>
<td>July, August (34)</td>
</tr>
</tbody>
</table>

Citations (Chart #2):
(1) By reporting date.
(2) As percentage of the maximum recorded.
(3) Monthly Population Count (=MC) or Weekly Ration (=WR), plus the number of reporting dates.
(4) RJ-10: 1792.
(5) RJ-10: 1793.
(6) RJ-10: 1796.
(7) RJ-10: 1796.
(8) RJ-10: 1796.
(9) RJ-10: 1796.
(10) RJ-14: 1800; RJ-22: 1829; F15, S3.
(11) RJ-14: 1800 and 1801; F16, S1.
(12) RJ-15: 1802.
(13) RJ-15: 1803; F17, S1.
(14) RJ-11: 1810.
(15) RJ-11: 1812; F20, S4.
(16) RJ-3: 1816; RJ-11: 1816; F22, S2.
(17) F23, S3.
(18) RJ-3: 1819; RJ-12: 1819; F24, S2.
(19) RJ-13: 1821.
(20) F25, S1.
(21) F25, S2; F25B, S2.
(22) RJ-17: 1825; F26, S2.
(23) F27, S2.
(26) F32, S2.
(27) RJ-4: 1831.
(28) F25, S1.
(29) RJ-17: 1827.
(30) F26, S2.
(32) RJ-18: 1827.
(33) RJ-21: 1828.
(34) RJ-22: 1829.

In the next few decades many efforts were made to set up more effective relations with the Indians, now almost entirely Apaches. The several reforms, each building upon the other, culminated in the famous Gálvez decree of 1786. This ushered in a new Indian policy together with a reorganization of the frontier military, within the framework of the Commandancy General of the Internal Provinces of the North established 10 years earlier. This Indian policy lasted, with some ups and downs, throughout the remainder of the colonial period, and for a
number of years after Mexican Independence. Significantly, it included instituting reserves for all Apaches who would acquiesce to settling in peace in this border zone of Spanish occupation, from Coahuila to what is today Arizona (Moorhead 1968: 45; 1975: 102ff; Navarro García 1964).

PEACE ESTABLISHMENT
MANAGEMENT

The Gálvez Instruction of 1786 (Gálvez 1786) was an insightful culmination of policy and practice of the previous several decades. It set up a new era of frontier administration that was successful in maintaining the border country in a relatively pacified state for the next several decades. Although immediate, effective implementation was impeded, by 1790 its provisions were being put into effect and many Apaches were taking up residence under presidial protection. These new people brought new pressures on the administration of presidios. By 1791, the Commandant General of the Provincias Internas felt it necessary to develop more specific regulations on how to manage the frontier. In October of that year, Don Pedro de Nava issued a comprehensive set of instructions, consisting of 37 articles, on peace establishment governance, which would last until the end of the period (Rey 1835; see also, Moorhead 1975: 259-266).

There were two thrusts to the new administrative stance involving the peace establishments. The first was, through rational administration, to keep the Apaches in a relatively peaceful state by minimizing overt conflicts between them and Spaniards as well as keeping down rivalries among the several settled rancherias. The second, an admittedly very long-range goal given Spaniards' experience with Apaches up to this point, was to lead these people eventually toward a permanently settled, civilized, and Christian way of life.

Spaniards were to assume new responsibilities toward Apaches. They would maintain good relations, and no deception would be tolerated—even in war. Officers would learn as much as possible of Apache customs, and they as well as their men were to learn the Apache language; Spanish officials were never to show the slightest irritation with Apache behavior. Only the manipulation to Spanish advantage of already existing jealousies among the settled rancherias would be permitted so long as they did not break out into open conflict. Caution had to be exercised in whatever action was taken in order that it would not be counterproductive. Troops and guards were to be well-disciplined and would act with formality, exactness, and vigilance.

Spanish officers were to educate the Apaches in Spanish ways by holding frequent conferences with Apache leaders. They would try to get over to the Apaches that there were some bad Spaniards who would try to disrupt good relations between the two groups. Officers would make friends with individual Apaches and interpreters who understood the Apache language well were to spend time visiting Apache camps.

Responsibilities in turn would be placed on Apaches. A leader from each rancheria would be selected to be judge and chief of his own people. While major crimes would be punished by Spaniards, minor transgressions would be handled by the officially designated chiefs. The goal was eventually to be able to find the right man to select as paramount chief over all the rancherias camped at a particular presidio.

Monitoring and controlling the movements of the peaceful Apaches were very important. Passports were issued to men travelling over 10
leagues away whether to hunt, to visit relatives, or to reconnoiter enemy territory while in service for the military. Apache families, nonetheless, had to remain at the presidios (essentially as hostages) where they were officially assigned. They would be granted license to travel short distances in order to harvest mescal or gather wild fruit.

Apaches at peace were to be induced to support themselves economically, because of the great expense of keeping them at the presidios and because it was thought this would help them become "civilized." Several efforts were made at Janos to teach Apache men agriculture although surprisingly little was ever done to stimulate cattle raising. At the same time, officials were of the opinion that Apache women, who were hard workers, could probably learn farm tasks rather easily. The men, on the other hand, were much too lazy to take to any kind of work; they could be employed most effectively in the military, whether as scouts, messengers, or auxiliary soldiers.

Rations, consisting of corn or wheat, meat, brown sugar, salt, cigarettes, and sometimes other items, were distributed to heads of households (including widows) once a week. Apaches living within a four league radius of a presidio were eligible, although rancherias living farther away, and even those who had not yet surrendered to Spaniards, could be supplied with some articles at the discretion of the fort commander. Chiefs were to receive more than other men. Gifts, such as clothing or riding gear, would be bestowed on favored Apaches or their wives on special occasions. Precise records were to be kept of all that was expended as well as all movements of Apaches and their families. These were to be remitted to the Comandancia General in Chihuahua City once a month.

Presidial commanding officers were to collect from peaceful Apaches all information possible about the rancherias that had not yet come into the Spanish fold. Military intelligence needed to know their regular camping spots, the names of their leaders, the number of warriors in each group, where they hunted and gathered, and the regions to which they frequently sent raiding squads. Armed with this, the commander was to order out special emissaries who would invite those still hostile or neutral bands to come in and live under Spanish protection. For the Spanish administration, then, this period was one of interim status for the not-yet-surrendered rancherias. If a band rejected all inducements to settle in peace, it was informed that henceforth it would be looked upon and treated as an enemy.

As soon as it was learned that a hostile group was within 20 to 40 leagues of a military installation, the commander would order out troops in pursuit. When peace was granted to a rancheria, the latter had to accept all restrictions and responsibilities, as well as benefits of Spanish protection.

THE EFFECTIVENESS OF THE PEACE ESTABLISHMENT

So much for Spanish intent. How, in effect, were the peace establishments managed and what success did they have? Although there is record of much of the above having been put into practice at Janos, more information is needed from other presidios before a very definite response can be given. Some preliminary assessments, nonetheless, can be made.

Taking the second question first, how successful in accordance with Spanish goals were the peace establishments? Even in the absence of reasonable quantitative data on the number and severity of raids before and after, it would seem they were essentially a success. On the one hand, Spaniards themselves, on the basis of criteria we are perhaps not
fully aware of, judged them worth the effort. They were expensive, but, by the administrators' own calculations, the price of policing peaceful Apaches was lower than the toll of lives, livestock, and other resources exacted by the raiders from Spanish settlements as well as the cost of the many punitive campaigns by the military. This was so, despite the fact that assaults by hostile bands of Apaches never entirely stopped and some military action was always necessary.

By the mid 1790s, the peace establishments reached the maximum of their effectiveness. The Commandant General at this time, balancing the cost of maintenance of Apaches at peace against other risks within the context of the successes already achieved, ordered that no new rancherias be accepted for settlement. Instead, these people after surrendering, as well as all others in residence who wanted to, could return to their own territories as long as they kept the peace they had agreed to honor. In any event, from approximately this time on, a smaller number of Apaches enjoyed regular support at the presidios, if the Janos case is reflective of the general situation (see charts). Even with the reduced level of activities, the colonial administration found it worthwhile to maintain the system until Independence. For a while Mexicans did also, until in their minds the cost became excessive and they sought modifications.

In 1831, the military commandant generals of the states of Chihuahua and Sonora decreed that, because of the paucity of available resources, the weekly rations would be discontinued. Since such rations, the logical substitute in the Apache economy for the goods acquired by raiding, were really at the heart of the system, Apaches began abandoning the presidios when this major tie between them and Mexican military administration was severed. The peace reserves then collapsed. Mexicans considered the Apaches in revolt; assaults and attacks on each other escalated, and a new era of Apache-Mexican relations was ushered in. The rapid rise in hostilities at that time only attested to the effectiveness of the peace establishments in the Spanish policy of pacification (Almada 1952: 68-77; 35-40).

The final avenue of assessment perhaps is the number of Apaches directly affected. Although no census of the total number of Apaches exists for that period, a guess from circumstantial evidence would be that from one-half to two-thirds or more of the groups generically known as Chiricahua and Mescalero were brought under the peace establishment system. The number of Apaches not recorded in official Spanish counts but who were affected either directly or indirectly by the peace establishments was probably considerably greater.

THE NATURE OF THE PEACE ESTABLISHMENTS AND APACHE CULTURE

The second goal of Spanish policy as originally put forth was the long-range one of "civilizing" the Apaches by destroying their way of life—by obliging them to forget Apache customs and to become Spaniards culturally. In actual fact, by the time of the reforms of the late 18th century, except for attempts to get the Apaches to support themselves agriculturally, Spaniards for the most part considered these goals as unrealistic and improbable of attainment. Apaches at Janos were never missionized and only a few ever received baptism. Indeed, specific prohibitions were issued against their being baptized, because it was assumed they were incapable of understanding Christian doctrine. More missionization of Apaches may have taken place at Tucson, however (Dobyns 1976: 41ff). The Apaches' camp organization and their mobility
even under the peace establishments, including destroying a house after a death occurred in it and moving to a new location, made it impossible to get them to form Spanish-style towns.

Spaniards, nonetheless, were able to match practice with policy to a considerable extent to attain their immediate goals. They instituted a system of rations, and developed administrative procedures for the surveillance and control of the peaceful Apaches, managing conflicts and meting out rewards and punishments. They were also able to restrain the local civilian population in its relations with Apaches so that a minimum of clashes broke out between the two (later in the Mexican period such conflicts got increasingly out of hand). Indeed, there developed some regular and intensive personal contacts between members of the two groups, especially between Apache leaders and Spanish officials.

Those rancherias that had not made peace, that had not perceived all of the advantages of the Spanish carrot, were forced continually to feel pressure from the stick. In the early 1790s especially, military action was increased, with patrols scouring the countryside on search-and-destroy missions, driving the Apaches into refuge, either to a peace establishment or northward to the regions the Spaniards claimed were outside of their own jurisdiction.

In overview, following the Gálvez reforms of 1786, Spaniards shifted the emphases of their frontier management. Military garrisons were more than doubled in size and more food and supplies were sent into the northern zone of contact. Spanish behavior toward Apaches became less erratic—previously it had varied from negotiations with some bands while attacking others with practically no provocation. Now there was a more consistent application of policy. At the same time, more was demanded of Spanish officials in judgment and skill in human relations, which in turn seems to have put pressure on the leaders of peaceful rancherias for more patience and understanding of Spanish conduct. Greater effort certainly was placed on diplomacy and negotiations. There was, then, a general improvement in administrative procedures while soldiers were employed to keep law and order—an activity of internal control once the Apaches became in effect a part of Spanish society as a special population administered by the Spanish military bureaucracy.

Despite these changes, the management of the peace establishments was essentially authoritarian and punishment centered; it was carried out by a military post that had the administration of peaceful Apaches tacked on to it. As a consequence, there was little concept of a territorial unit to which the Apaches belonged (that is, nothing like reservation boundaries), except ill-defined jurisdictions of the military units and the even more vague territories in the hinterland with which Apache rancherias were associated.

In such a program, then, no effort was made to replace many major areas of Apache culture. There was no direct interference in the patterns of settlement of Apache camps, in kinship and family relations, in forms of childrearing, or in religious beliefs and rites. Indeed, Spanish officials recognized that Apaches frequently had to be treated very gently, that any overt intervention in these realms might very well be counterproductive for the immediate goals of pacification. Rations were distributed and Apache men were expected to aid the military—otherwise they were to keep quiet.(3)

The cultural integrity of Apache rancherias was thus disturbed very little. Spaniards utilized native leadership where possible, and they expected Apaches to continue their traditional subsistence activities of hunting and
gathering. Only raiding as an economic activity and warfare were expressly prohibited them. To what extent Spaniards actually believed that Apache culture would disappear under these conditions is difficult to assess. In actual fact, so little replacement of the Apache way of life took place that it seems there never was much question of their being able to return to their own territories and continue entirely on their own as they had before the peace establishments.

This is not to say that Apaches did not make some adjustments. They did, but alterations in their way of life were in the nature of mere additions to their culture, not as fundamental replacements or reorganizations. Apaches did learn how to carry on negotiations and to deal with Spaniards, and they became acquainted with many items of Spanish technology including new foods. At the same time, for any group not at peace, war and preparations for war increased under Spanish pressure. This served to strengthen core areas of the Apache way of life—male prestige and ranking, patterns of leadership, and religious beliefs and rites connected with war and the avenging of slain kinsmen, adding to a more intense in-group feeling. In short, outside threat reinforced the Apache moral order.

THE END OF THE PEACE ESTABLISHMENTS

The peace establishments did not terminate in 1831. Although Mexican officials in that year actually undermined their effectiveness as operative units, they considered colonial policy to be still in effect (twice reissuing the 1791 Instructions), albeit with some changes. Apaches were to return to Janos to reside in peace on at least two occasions. In the years 1842-1844, as many as 400 to 500, and at times up to 600, people were reported receiving rations at the presidio itself or at the nearby town of Corralitos. Again, in the year 1857, as many as 600 Apaches were at Janos. While these settlements were short-lived and the Apaches soon returned to their territories, each time Mexican officials felt that they had scored a major victory by getting the Apaches back to the places where they "really" belonged (that is, to their longtime residences in the colonial period) and by achieving, although only momentarily, the expected reduction in frontier hostilities. Nevertheless, outside these periods of truce at Janos, and perhaps at a few other presidios, relationships between Apaches and Mexicans only deteriorated.

What factors contributed to this progressively declining situation of the Mexican period? Here there are some major contrasts with colonial times. As already noted, Spaniards invested much effort and many resources into making pacification work. After Independence, Mexican administrators had many less means at their command, especially as the new republic found itself in increased political turmoil farther south. Consequently, they made a number of changes besides canceling the weekly rations (already alluded to), changes that were sometimes contradictory or counterproductive, while they continued to imagine that the system could still be kept intact. In addition, individual Mexican states began to operate more autonomously and often clashed with each other as overall unity and policy coordination were lost. It was this situation that North Americans found when they entered the region in the late 1840s.

Other conditions or events adversely affected the overwrought and overextended Mexican administrators. One was population loss in the region. Janos, for example, dropped from almost 2000 people in 1817 to a recorded 275 in 1825, while the garrison retained only a handful of men compared
with the earlier 125. Resident Apaches, although camped some distance away from town and fort, formed a high percentage of the local population. In addition, increased raiding was reported throughout the region, and tensions between local Mexican citizenry and Apaches mounted.

The years after independence also saw the development of new relations between Apaches and outsiders. North Americans, trappers and miners as well as merchants, began entering the area. Trade between the United States and Chihuahua City via the Santa Fe trail was opened up. This brought in many new goods and some reached Apaches, much acquired in raids but also a considerable amount through illegal but peaceful trade, frequently with Mexican merchants. As Mexican power waned, especially after 1831, Apaches wielded increasingly more influence in local events. Individual towns made treaties (called, "partial peace") with specific Apache rancherias, that is, agreements that would insure peace for a particular Mexican settlement, often at the expense of other towns or places. As part of this pattern of separate local truces, Apaches also exchanged goods with the local residents. Thus Apaches played an important role as middle men in the distribution of a considerable quantity of often much needed resources, including livestock, which they took in raids from one place and traded in another. Indeed, Apaches were said to offer excellent bargains. The magnitude of this activity at times can be seen from accusations made by Sonorans in the 1840s that Chihuahuans lived off trade in cattle rustled by Apaches in Sonora.

In addition, Apaches had a practice of economic reciprocity or "gift-giving" among families. The precise impact of the system is undeterminable at this point, but it probably had considerable consequence in keeping the peace in earlier times. Because of extensive kinship relationships and mutual family obligations among members of different Apache bands, individuals not directly under a peace establishment were presumably often the recipients of articles originally distributed as rations. Consequently, the discontinuance of these allotments in 1831 no doubt affected many more Apaches than just those in official residence at the presidios, which accounts for the apparently greater number of hostiles at the time than simply those people who moved away from the jurisdiction of their peace establishments.

As this deteriorating situation exasperated responsible Mexican officials, they made desperate decisions they hoped would alleviate the burden of Apache inroads. Sonora in 1835 and Chihuahua in 1849 decreed a bounty on Apaches, a measure that was counterproductive in the extreme. As increased violence was wreaked upon Apaches by Mexicans and renegade Americans seeking Apache prisoners or their scalps, often obtained by treachery in peaceful contexts, Apaches responded in kind. They stepped up their assaults in order to avenge the deaths of their kinsmen. The increased attacks led to an even greater decline in relationships between the two peoples—whatever regard Apaches had held for Mexicans (partly from their previous close contact with them at the peace establishments) then turned into increasingly bitter disrespect and hatred. It appears that Apaches subsequently tried more and more to play Mexicans off against each other. When North Americans entered the scene at mid-century, Apaches attempted to enlist the aid of these newcomers against their remorseless and ruthless enemies, the Mexicans.

North Americans, as they stepped into this situation in the late 1840s, had little grasp of the complexity and depth of the Apache-Hispanic relations
they encountered (see Thrapp 1967 and 1974). Perhaps if they had known more, or had been more willing to learn from others instead of becoming so bogged down in their own inconsistencies in policy, in its implementation, and in bureaucratic rivalries, they could have avoided some of the disasters they perpetrated on these Native Americans until the end of the so-called Apache wars in the 1880s.

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FOOTNOTES

(1) All the mental gymnastics required for this calculation are too complicated (or perhaps, too simple!) to be gone into here. There may have been some 8,000 to 10,000 Apaches at this time, including White Mountain, Chiricahua, Mescalero, Jicarilla, and Lipan. The two principal groups involved in the peace establishments, Mescaleros and Chiricahuas, possibly totaled 3,000 to 4,000 persons (the Chiricahuas would include Chiricaqui proper—as they were known in the Spanish documents—Mimbrenos, Gilenos, Mogollones, and Pinalenos at a later date, as well as probably some Coyoteros reported in Sonora). Only more research will improve such population estimates. Also, the 1793 figures for Apaches at peace may not be complete, since some presidios were not reported; and, at least at Janos, two years later over twice as many Apaches were recorded living there (see Matson and Schroeder 1957).

(2) My ideas about culture change and the nature of human communities administered or controlled by a bureaucracy have been heavily influenced by Kushner (1973) and Spicer (1961; 1962: 344-358; 1968). Spanish administrators originally considered alcoholic beverages to be a good device for creating dependency among the Apaches on the presidios; alcohol was later seen to be disruptive and, from the available evidence, was seldom given to Apaches.

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In the spring of 1598 Don Juan de Oñate led his band of 129 Spanish colonist-soldiers and 10 Franciscans to permanent settlement within the lands of the New Mexico Pueblo Indians. With him he brought also the institutions and administrative machines of imperial Spain evolved throughout a century of colonial experience, including the legal obligation to abide by the comprehensive body of laws and ordinances regulating the treatment of the Indians and the conduct of Indian affairs which had been enacted during those years.

The discovery and conquest of the New World had followed closely on the successes of the "Catholic Kings," Isabella and Ferdinand, in unifying Spain under royal control by curbing the autonomy of the municipalities, ignoring the representative body, the Cortes, and curtailing the powers of both the nobles and the Church hierarchy in temporal affairs. At the same time, the militant orthodoxy of the Spanish rulers had succeeded in the religious unification of Spain with the final defeat of the Moorish kingdom of Granada and the expulsion of the Jews. Colonial institutions reflected both the absolutist nature and orthodoxy of the monarchy. By virtue of the patronato real (royal patronage), conceded by the Papacy, the Church in Spanish America was subject to the Crown in all matters except doctrine and religious discipline and was supported in part by the national exchequer, thus becoming another arm of the State (Scholes 1937: 1-4).

From the beginning of the conquest the Spanish Crown had intended to restrain the actions of Spaniards in dealing with the Indians as newly discovered regions were occupied and pacified. Conversion of the natives from their paganism to Spanish Catholicism, and in the process bringing them the "blessings" of civilization, Spanish-style, at the same time affording them protection from mistreatment, was a major policy of colonial administration. The Indians were also considered to have the same status of royal vassals as did Spanish subjects. In 1499 Queen Isabella on hearing that Columbus had assigned 300 Indians to Spaniards angrily asked: "by what authority does the Admiral give my vassals away?" (Hanke 1949: 20). Conversion and humane treatment of the Indians as royal vassals were basic principles of colonial administration. Of greater import, unfortunately for the natives, was the policy of exploiting the economic resources of the New World for the benefit of the Spaniards. The Indians were to be converted and protected, but their labor was considered to be an economic necessity in order to develop the industries and agriculture of the colonists. Indian tribute was necessary to support the institutions of the privileged European ruling class.

The wanton disregard for Indian right and welfare by colonial authorities and Spanish settlers during the half-century following conquest led to increasing demand for reform, especially from the religious orders, which had aroused the royal conscience. As a result, sweeping laws were enacted and cédulas (royal decrees) and ordinances promulgated which were designed to protect the Indians in their personal as well as their communal land and water rights so that by the time of the Oñate entrada the Indians had the legal position of being both royal vassals and royal wards (Jenkins 1972: 113-114).
THE ENCOMIENDA AND THE REPARTIMIENTO

Undoubtedly the most pernicious institution of 16th century Spanish colonial administration so far as the Indians were concerned was the encomienda system. Originating out of the feudal practice of the Crown in temporarily granting to Spanish knights manorial rights over the peasants on lands conquered from the Moors, the New World encomienda was a labor grant, based upon the concept of the Crown or its representatives "commending" or placing Indian communities under the patronage of nearby Spaniards. The encomenderos had the right to exact labor and tribute in return for allegedly protecting the Indians and providing for their Christianization. The result was their virtual enslavement as the encomenderos attempted to use the system to create a hereditary colonial noble class. In 1542-1543 Charles V promulgated a sweeping reform code known as the "New Laws," due largely to the crusade of the Dominican Bartolomé de las Casas, against Indian abuse as well as to the royal determination to curb the feudal aspirations of the encomendero class. The status of the Indians was clearly defined in Article 10: "The Indians are free persons and vassals of the Crown" (Simpson 1950: 129). Other provisions were intended to systematically eliminate the encomienda system. Royal regulations issued in 1549 forbade personal service or labor and limited the obligations of the Indians to tribute only. Not even crown officials could commute royal tribute into personal service. Encomenderos were also forbidden to live on their encomiendas (ibid.: 145 et seq.; Haring 1947: 55-60; Hanke 1949: 86-105; Gibson 1966: 48-67).

With the reduction of encomendero rights to tribute, the repartimiento came into existence as a separate institution. This was the right of Spaniards to use allotments of Indians for involuntary but paid labor in mines, agriculture or public works. Thus, forced paid labor theoretically replaced forced labor, but in practice the difference was often nonexistent. Such labor was for a specified period only; the applicant promised to treat the Indians well and payments were usually stipulated as a real per day. An encomendero might apply to receive a repartimiento for workers on his own fields or in his mines, but, as was the case in New Mexico, the labor force was usually not drawn from the Indians of his encomienda (Gibson 1966: 143-147; Haring 1947: 64-68).

As a result of the reform movement strictly military expeditions into newly discovered areas for purposes of conquest and exploitation with their high-handed treatment of the inhabitants, such as that led by Coronado into New Mexico in 1540-1541, were no longer to be countenanced. On July 13, 1573, an extensive compilation of instructions and regulations entitled "Ordinances of His Majesty for the New Discoveries, Conquests and Pacifications" was issued by Philip II to closely regulate the occupation of new territories. Colonizing expeditions were to be undertaken by authorized leaders only. The patterns they were to follow in founding towns and settlements and instituting the usual offices and procedures of local government were prescribed in detail. Frequently referring to the natives as "Our Indian vassals," the Ordinances particularly specified that moderation and persuasion were to be used in introducing the modified encomienda-repartimiento so that the natives would willingly accept Spanish sovereignty (Colección de Documentos Inéditos Relativos al Descubrimiento, Conquista y Organización de las Antiguas Posesiones Españoles de América... 1871(16): 142-144, 184-186).

Explicit instructions to observe the Ordinances were given to Oñate
as part of his contract to colonize New Mexico:

Both during the organization and progress of the expedition and after the people have been reduced and placed under obedience to the royal crown, you must observe all that is contained in the royal order issued at Bosque de Segovia on July 13, 1573, containing the royal ordinances for new colonizations and pacifications in new discoveries in the Indies, as well as the contract made with you by virtue of those ordinances for the expedition and you shall carry a testimonial of the said royal order and capitulations [Hammond and Rey 1953:1, 65].

To insure that the Indians became royal vassals one of Ofate's first acts was to gather representatives from many pueblos at his San Juan headquarters on September 9, 1598, and persuade them to swear oaths of allegiance to the Crown (Ibid.: 342-344). Obviously, the Indians had not the slightest conception of what this expression of fealty meant.

Ofate apparently did not make encomienda allotment of the pueblos for several years although royal tributes were collected (Snow 1983: 349). In the meantime, the Council of the Indies, in 1602, fixed encomienda tribute at either a manta or a hide, and a fanega of corn per year for each householder (Hackett 1937: III, 120). The repartimiento was definitely being used, and abused, in 1621 when on February 5 the viceroy sent a lengthy order to Governor Juan de Eulate ordering him to cooperate with the religious and to stop illegal exactions from the Pueblo Indians. Repartimientos for farming and herding livestock were to be made only from pueblos close to the Spaniard involved. No more than two percent of inhabitants from any pueblo were to be required for a labor detail at any one time; levies were not to be made when the Indians were sowing or reaping their own crops; the Indians were to be paid a half real daily and were to be properly fed; there was to be no use of Indian women for house service unless they were accompanied by their husbands and performed such labor voluntarily (Bloom 1928: 366-367).

The encomienda-repartimiento system was justifiably deeply resented by the Pueblo Indians as well as a source of conflict between governors and friars and between governors and encomenderos. It was not reintroduced after the Pueblo Revolt with the single exception of an encomienda granted to Diego de Vargas in 1698 and to his family for two generations, but even this was never utilized and in 1726 was exchanged by Vargas' heirs for a pension (Espinosa 1942: 318-321).

RELIGIOUS ADMINISTRATION
THE FRANCISCANS

The reform movement which had viewed Indian abuse as unchristian led to increased efforts at conversion and control over the Indians on the part of the religious. Until late in the 18th century the Orders, particularly the Jesuits until their expulsion in 1767, and the Franciscans were primarily responsible for Indian missionary efforts. In his contract Ofate agreed to bring Franciscans to assume responsibility for Indian conversion in New Mexico and to administer to the spiritual needs of the settlers. Eight friars and two lay brothers were in the expedition. As was true of other colonial institutions brought to New Mexico, however, the nature of the Pueblo Indians resulted in the establishment of religious administration quite modified from the Franciscan mission system which developed elsewhere.

Although its purpose was conversion, the mission, or congregación, of the Jesuits and Franciscans became an
effective institution for Spanish military and political control as the conquest of Mexico spread northward beyond the area of the sedentary Indian groups into lands occupied by nomadic and unsettled bands and tribes. The religious attempted to persuade these groups to accept permanent settlements (congregaciones) where they could be converted and instructed in the pursuits of agriculture and stock raising. Congregaciones were introduced into frontier regions where there were no mines to be worked or other economic resources which could be exploited. The mission was laid out in the standard Spanish town pattern with buildings for common purposes centered around a plaza and the mission church located in its center. Dwellings were constructed in regular blocks. Tillable land adjacent to the village was brought under cultivation as the friars taught the Indians how to construct irrigation ditches and raise crops. Mission livestock tended by "the sons of the mission" were grazed nearby. The friars were to be missionaries only, and so diligent in their efforts of instruction and conversion that at the end of 10 years the agricultural land could be turned over to the Indians and their ecclesiastical jurisdiction transferred to the authority of the nearest bishop who would send secular priests to minister to them (Kelly 1940: 349-350; Haring 1947: 71; Gibson 1966: 197-198).

The Franciscans with Oñate assumed that their role in New Mexico would be similar to that in other regions and referred to their missions as congregaciones (Scholes 1930: 100). But the Pueblo Indians, like those in the established villages of southern and central Mexico and unlike the nomadic groups in the north, were living in agricultural communities when the Spaniards arrived and had long since utilized acequia irrigation and had their own tribal organization and government. On September 9, 1598, after receiving the oaths of allegiance, Oñate assigned the friars to individual pueblos or groups of pueblos (Hammond and Rey 1953:1, 345-346). The pueblos were not assigned to the Franciscans. No attempts were made to change the village pattern and the mission churches and conventos were usually constructed at the side of the village so that New Mexico pueblos had a native religious orientation as well as a Catholic orientation. The land was not the friars to develop or assign. They were given plots for their use, which the natives tilled for them, within the Indian fields.

In 1623 New Mexico was elevated to the status of a custodio, known as "The Conversion of St. Paul," a major administrative unit of the Franciscan Province of the Holy Gospel headquartered in Mexico City. The Pueblo of Santo Domingo was selected as the ecclesiastical capital. Spanish settlers outside Santa Fe were communicants of the nearest pueblo church, and while the capital was technically a parroquia (parish), it too was administered by Franciscans until the 1700s.

The Ordinances enjoined the religious from using methods other than patience and kindness in their conversion efforts:

In order to do this they will not begin by rebuking them for their vices and idolatries or by taking from them their women or their idols so that they are offended or become hostile to Christian doctrine. Rather, they must first be taught and after they are instructed they will be persuaded of their own free will to abandon that which is contrary to our Holy, Catholic Faith and evangelical doctrine (Docs. Inédos...1871[16]: 182).

Unfortunately, as was true of many other provisions, this section was honored more in the breach than in the observance. Overly zealous early
friars attempted to forcibly stamp out native rites, demanding cooperation from the governors and bringing charges against those who did not comply. As a result, some 21 Franciscans met violent deaths at the hands of the Pueblos when the 1680 revolt broke out, and the few who survived retreated with the other Spaniards to the El Paso area. Custos Fray Salvador de Antonio and 17 other Franciscans were in Vargas' recolonizing expedition of 1693, but some padres met their deaths in the 1696 revolt (Espinosa 1942: 129, 246-248). The Franciscans had learned their lesson well as a result of the events of 1680-1696, and made no consistent attempts to abolish native rites, but rather attempted to incorporate many of them, especially the dances, into the context of Catholic worship. In accordance with the law, they absented themselves from the pueblos on the days for tribal elections. The controversy between Franciscans and civil authorities although not as bitter as in the pre-Revolt era, continued until late in the 1700s as the padres came into conflict, particularly with the alcaldes mayores, over issues involving the Pueblo Indians (Jenkins 1961: 53-54). The official Spanish colonial policy of secularizing the missions by replacing the Franciscans with parochial priests responsible to the diocesan bishops led the Bishops of Durango to increasingly assert their authority. Due to the shortage of secular priests, however, the policy was only gradually put into effect in New Mexico, and the Custody of St. Paul slowly eroded away as the Franciscans departed or died and were not replaced (Chávez 1957: 4). Although their numbers were much reduced, Franciscans continued to administer the pueblo missions until after the break from Spain in 1821.

PROTECTION OF INDIAN LAND

The most important reform measures taken by the Crown to fulfill the royal wardship obligation, and which had the greatest impact on New Mexico Pueblo Indians, were the numerous cédulas and ordinances issued to protect Indian lands from encroachment and to assure that the original inhabitants had adequate land for their needs. The basic land protective decree was that of 1533: "They [the viceroys and governors] shall leave to the Indians their lands, patrimony and pastures in such a way that the Indians may not lack what they need, and that they may have all the relief and repose possible for the support of their homes and families" (Recopilación de leyes de los reynos de las Indias, 1681, Book IV, title 12, law 5).

Indian right to sufficient land was further stipulated in a decree of Philip II, November 20, 1578, which ordered also that all land not legally granted to Spaniards was to be returned to the royal domain: "There shall be apportioned to the Indians what may be conveniently necessary for them to cultivate and plant and to raise stock, and the lands which they now have shall be given them [Recop. Book IV, title 12, law 14]." A cédula of June 11, 1594, was even more specific concerning restrictions on Spanish grantees: "We order that the estancias [livestock grazing grants] and lands granted to the Spaniards will be without damage to the Indians, and that those given to their damage and harm be returned to whomever they rightfully belong [Recop. Book IV, title 12, law 9]."

When New Mexico was colonized in 1598, these injunctions were in effect, and were strengthened during succeeding years. Philip IV, in decrees of March 16, 1642, and June 30, 1646, ordered that in all land adjudications for or by Spaniards, the Indians would be fully guaranteed their land and water rights:

We order that the sale, grant and adjustment of lands be done with such consideration that
there are left to the Indians, with an excess, all those which belong to them, individually as well as communally, and the waters and irrigation systems; and the lands on which they have constructed acequias, or any other improvement through which by their personal effort they have rendered fertile, are reserved in the first place, and cannot be sold or alienated [Recop. Book IV, title 12, law 18].

At the same time he issued still another decree that Spanish settlement on Indian lands secured through fraudulent title should be nullified (Recop. Book IV, title 12, law 17).

The above laws had been primarily for the protection of the lands of the established, sedentary Indian villages in southern and central Mexico, which the Spaniards found in 1517. As the rich mining and livestock raising areas to the north were conquered a policy of concentrating the wandering bands who inhabited them into fixed settlements called reducciones became another frontier institution. Somewhat similar to the congregación, the reducción came into existence as a result of a March 26, 1557, cédula of Charles V which ordered the royal officers to see to it that the nomadic bands were gathered into pueblos or reducciones for convenience of conversion (Recop. Book VI, title 3, law 1). Unlike the congregación, however, conversion was not the real purpose. The reducción system made it easy to allot the newly-established communities to encomenderos for tribute exploitation and resulted in widespread abuse of Indian labor in repartimientos for mines.

The Indians placed on reducciones were, however, also royal wards and a 1573 cédula of Philip II, issued shortly after the Ordinances for New Discoveries were promulgated, spelled out the land rights of these Indians: "The sites on which pueblos and reducciones are to be formed shall have advantages of water, land and wood, entrance and exit, and lands for cultivation, and an exido of a league in length, where the Indians can have their stock without their mixing with those of the Spaniards [Recop. Book VI, title 3, law 8]."

Even if the Indians accepted reducción status they were to be permitted to retain and cultivate any lands which they had formerly held (Recop. Book IV, title 3, law 9). A 1618 law ordered that livestock grazing grants to Spaniards also be at a distance from reducciones and provided strong penalties, including forfeiture of the grant, for those who permitted their stock to cause damage to the Indians (Recop. Book VI, title 3, law 20).

The Ordinances assumed that the reducción system would be applicable in all newly settled regions. But the Pueblo Indians, already living in settled villages when Oñate arrived, having taken the required oaths of royal vassalage, were entitled under the laws to having the lands protected which they effectively used and occupied. They were not subject to being reduced and having sites selected for them.

The chief purpose of the 1598 expedition was to settle the soldier-colonists, and those who followed them, on land where they could support their families. Oñate and his successors were responsible for granting land from the royal domain to the Spaniards, commonly referred to as vecinos, at the same time that they were legally bound to protect Indian lands. The two duties were not always compatible, especially since much of the best agricultural areas had long been utilized by the Pueblo Indians. Procedures for granting land to Spaniards before the 1680 revolt cannot be determined, due to the destruction of documents during the uprising and
no records have come to light in archives in Spain or Mexico. Whether by virtue of specific written grant, by verbal permission of the governors or whether by some sort of semi-feudal manorial concession, Spanish families settled the Rio Grande valley from the area around the Piro Pueblo of Socorro as far north as the valley of Taos and east into the Galisteo Basin. Due to the availability of irrigable land, one region of particular concentration was that known as "La Cañada," along the Santa Cruz stream east of the Tewa Pueblo of Santa Clara. Another was in the Bernalillo-Albuquerque "Rio Abajo" region. No Spanish town or community grants were made before the revolt, at least of which a record has survived. The sole formal municipality was the headquarters which Oñate established at San Juan Pueblo in 1598, moved across the river the following year to San Gabriel and which Governor Pedro de Peralta permanently located as the capital at the site of the Villa of Santa Fe in 1610.

Whatever the process of allotting land to them, the Spaniards raised irrigated crops, grazed their livestock and some built sizeable hacienda-like establishments so that virtual feudal estates emerged. Laws to the contrary, they settled near pueblo villages and encroached on Indian land. This situation, combined with the entire tribute-forced labor system with its exactions demanded by encomenderos, governors, and Franciscans, culminated in the bloody explosion of August 10, 1680. In the same year, ironically, the massive volume of cédulas and regulations concerning Indian land and water rights were incorporated into the great colonial code, Recopilación de Leyes de los Reynos de las Indias, and continued in effect to the end of Spain's rule in 1821.

In 1692 General Don Diego de Vargas made a peaceful reconnaissance of New Mexico to test the mood of the Pueblos, and met with no real confrontation, although matters appeared threatening until the Tanos let him enter the Villa of Santa Fe. He toured the pueblos, with Fray Francisco Corvera pronouncing absolution and baptizing the children (Espinosa 1940). When the Reconquistador returned with the colonists the following year, however, the attitude had changed and the Pueblos were in no welcoming mood. After retaking Santa Fe in late December with a heavy toll of Indian lives, Vargas executed many of the leaders and turned over others to Spaniards for ten-year sentences at hard labor, although some were later commuted. Not until September of 1694 was peace reestablished, and then not for long as many pueblos, especially Taos, Picurís and the Tewas, except Tesuque, remained unreconciled.

During the years of Spanish exile the Tanos pueblos of San Cristóbal and San Lázaro had moved from the Galisteo Basin, largely because of fear of the Apaches, and had relocated their villages on the south side of the Santa Cruz stream in the Cañada area. They were thus close, and welcome, neighbors of Santa Clara and San Juan. In March of 1695 Vargas proclaimed the establishment of "La Villa Nueva de Santa Cruz de Españoles-Mexicanos del Rey Nuestro Señor Carlos Segundo," and placed Spaniards in possession of La Cañada "as far as the Pueblos of Nambé, Pojoaque, Jacona, San Ildefonso, Santa Clara and San Juan" (Spanish Archives of New Mexico I, no. 886). He preemptorily ordered the inhabitants of San Lázaro to move onto San Juan land and those of San Cristóbal to resettle near Chimayó. Aroused at the presence of the Spaniards back in their midst the Tewas, joined by Taos, Picurís and several other pueblos, again rose in wrath in June, 1696, killed the missionaries and fled their villages, taking refuge in the mesas and mountains. The uprising was soon
ended, partly by military force and partly by the seizure of Indian fields and stock. The little Tewa pueblos of Jacona and Cuyamungue were abandoned and their lands soon regranted to Spaniards. The San Cristóbal and many Santa Claras fled to the Hopis, although the latter later returned to their former village. The Pojoaques also fled. A remnant was gathered up by Governor Antonio Cuervo y Valdés in 1707 and returned to the village, but most of the agricultural land had by then been conceded to Spaniards. Both Vargas and the even less admirable Pedro Rodriguez Cubero, who served as governor between the former's two terms, made several illegal grants to settlers which were clear encroachments on the Tewa pueblos and which were to cause headaches for their successors and constant harassment for the Indians (Jenkins 1972: 118-132).

Fortunately, later governors were more conscientious, by and large, in protecting Indian lands. Following the death of Vargas, a land grant system in which the governor made farming or grazing grants to individual Spaniards and settlement grants to groups of heads of families according to a clearly defined procedure marked the land tenure system through the Mexican period. This policy originated in a royal cédula of 1684 during the El Paso exile appointing Domingo Jironza de Cruzate governor of New Mexico, when the region was reconquered, and giving him the power to make grants, but in conformity with the provisions and regulations contained within the Recopilación (SANM, I, no. 1338).

One act of Vargas which was of lasting benefit to the Pueblo Indians, however, was the establishment of the office of Protector of the Indians and the appointment of Alfonso Rael de Aguilar to that post. This official was responsible to the Protector General of the Indians in Mexico City who in turn was appointed by the viceroy until the creation of the Provincias Internas in 1776 when the Protector General for the northern jurisdiction came under the Audiencia of Guadalupe. The provincial Protector was charged with defending the rights of the Indians against any type of oppression, even from the alcaldes mayores, the chief local officials appointed by the governors. He was to appear on behalf of the Indians before the governor and, if necessary even before the courts (Simmons 1968: 189-190). Most of the actions of the New Mexico Protectors of the Indians throughout the next century involved defense against land encroachment.

Both before and after the Revolt the Pueblo Indians were entitled to their land regardless of any actual documents of concession. An historical misconception has been perpetuated in New Mexico history that specific grants, usually four square leagues in extent, were at some time made to each pueblo. The confusion may have resulted from the provision that the standard grant for a Spanish settlement, often referred to as a pueblo, was a league (approximately three miles) in each direction from the center of the plaza, although this norm was seldom applied in New Mexico. The only reference to a league in the innumerable land laws for either sedentary or reduced Indians seems to be the stipulation in the 1573 cédula that reducciones should have "an exido of a league in length" for stock, but this was only a guarantee for grazing land. The lands for the village proper and for Indian fields were in addition to the league for grazing. The Pueblo Indians did not have livestock before the Spanish entrada and the word league with reference to their lands does not appear until after the Pueblo Revolt.

During the 18th century, adjudication of disputes over land between many of the pueblos and Spaniards,
and sometimes between two pueblos, often involved the location of the "pueblo league," or "the given league," measured in each direction from the church or plaza, but the evidence in these cases indicates that the league was but a recognized minimum right of the Indian community. In representing the Pueblo of San Ildefonso in its appeal against the encroachment of influential Ignacio de Roybal before Acting Governor Juan Paéz Hurtado in 1704, Protector Rael de Aguilar petitioned that a league in each direction be marked out for the sole use of San Ildefonso (SANM, I, no. 1339). This appears to have been the first application of a four-square recognized minimum right of a pueblo, and this was for agricultural, not grazing land.

The rights of the Indians, irrespective of any grant were well stated by Protector of the Indians Carlos Fernández on May 24, 1786, in defending a case brought by the Pueblos of Santa Clara and San Ildefonso against the Spaniard Marcos Lucero who claimed one of the illegal grants made nearly 90 years before by Vargas: "It is useless to ask that Indians established in pueblos present grants to the lands they justly possess, because their grants are manifest in the royal laws of our sovereign to which no objection can or should be made" (SANM, I, no. 1354). The only original, genuine title for a pueblo grant was that made by Governor Joaquín Codallos y Rabal, May 5, 1748, for the reestablishment of the Pueblo of Sandia which had been abandoned during the Revolt (Records of the Surveyor General of New Mexico, no. P).

As a result of the relatively consistent enforcement of the laws by the governors after the reconquest, and particularly because of the constancy exercised by the Protectors of the Indians in discharging their obligations to their clients, the Pueblo Indians became keenly aware of their legal rights in taking their petitions against encroachment and other damage to the authorities. During the eighteenth century, they became skillful litigants in utilizing the judicial process to their advantage, a strategy at which they are still most adept.

Santa Fe, New Mexico

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THE WELLS IN THE PALACE OF THE GOVERNORS PATIO
AND
THE EXCAVATION AND REPAIR OF WELL I. LA 4451

MARJORIE F. LAMBERT

HISTORICAL BACKGROUND

The Royal Houses, including the present Palace of the Governors, were only a small part of the vast complex which took form during and after 1610. In fact, it took decades of planning and construction from that year until 1680, the year of the great Pueblo Indian Rebellion. In a span of a very short time, the Indians killed hundreds of Spanish colonizers outside of Santa Fe, destroying farms, livestock, homes, churches, and ecclesiastical items. The Indians launched their war against their Spanish oppressors with very good reason.

Then, with the initial success of the campaign against outlying settlements, the Pueblo warriors were ready for the siege of Santa Fe, the Royal City. Plundering, burning, and killing, they vented the full fury of their hatred against Governor Otermin and his subjects, all of whom were barricaded in the Palacio Real.

Probably the one most effective strategy employed by the Pueblo attackers, and one which led to the evacuation of the Royal Palace and Santa Fe, was their cutting off of the only water supply which led into the complex through an acequia. With no water, the siege was soon over. Otermin and his sorry band of followers wearily left a burned and battered Santa Fe. With Indian sentries watching from strategic points along the way, they journeyed southward to the area of present-day El Paso, Texas.

This march has become one of the horror tales of all times. So terrible was their plight that by the time they reached their final destination, it is recorded that they had not one stitch of clothing on them (Dr. Myra Ellen Jenkins lecture at School of American Research, March, 1983).

In the ensuing 12 years following the 1680 Indian uprising, New Mexico and Santa Fe were again in the hands of the original Pueblo owners. But in 1692, a relentless reconquest of New Mexico began under the leadership of Captain General Don Diego De Vargas, a campaign which was to last several years.

The Spaniards found the Villa of Santa Fe strongly fortified, and occupied by Pueblo Indians, including what were formerly the Royal Houses and the Palace of the Governors.

De Vargas did not succeed in reconquering Santa Fe until 1693. Incredible as it may seem, he finally routed the Indians from their fortification by using the same ruse the Pueblos had employed against Otermin and his subjects in 1680. He diverted the water supply from the acequia leading into the Palace complex.

Before proceeding, I would like to speak of some information I was given about the Palace acequia shortly after I came to the Museum of New Mexico as a curator in 1937, and at a time when I was already showing more than a passing interest in Santa Fe history. The late Sam Huddleston, maintenance chief, and his assistant, Ray Ghent, were laying the foundations for the Library at the east end of the Palace patio in 1930 (conversations with Huddleston).

In the course of their work, they uncovered a cobblestone lined ditch running eastward toward Washington Street and westward into the Palace patio. They thought it of sufficient
interest to leave part of the acequia exposed as an exhibit. Feeling that it might be a hazard to visitors, however, the administration ordered it covered over. The addition Huddleson built as the Museum library is now a gift and book shop, and the major portion of the acequia lies beneath the cement floor.

It seems possible, then, that Huddleson and Ghent did indeed uncover what may have been the old 1680 Rebellion period acequia, the only source of water then available for the Royal Palace.

One of the most interesting documents pertaining to the Palace, its contents, and its patio originated during the governorship of Don Felix Martinez, 1715-1717. There had been some discussion regarding the razing of the Palace and building a new structure in its place. As a result, a survey was made in 1715, at which time the Palace and its contents were scrutinized and described. Of special interest is that a description of the patio, or courtyard, was also made (Archive No. 253, State Records Center, Santa Fe).

Here is a translation of part of that archive made by R. E. Twitchell (1925: 59-60).

Said palace has a court on the east side with very dilapidated walls. The main entrances to the palace on the south side, on the royal plaza; through one of them runs a wide covered passageway (saguan), giving admittance to the court yard (patio) where the body-guard is stationed, and the other inside plaza serves for the quarters (cuertēles). In said courtyard is a stable with a coach-house for the light gig, and two rooms, one above and one below, built of adobe, in which the said General Don Juan Flores kept and used a large chopping-block, and there is a dovecote where a small lantern used to hang, but nowhere is there any other article in which to grind grain. At the corners of the palacio real stand two towers (torre-ónes), extremely dilapidated, all of adobe, one of them with seven timbers (props) which hold up the roof, and in that one is now kept the stores of gunpowder. The said governor, Don Felix Martinez, put in a new door as soon as he took possession; realizing that the afore-said tower ran a great risk, being filled with powder, since its door was broken and it was easy to enter it. He also had a well dug in the patio four varas wide and forty in depth, with a curb of earth and stone, which is partly destroyed. At present it has no water but there is a wooden bucket; also said general found in the palacio real and took possession of five broken wooden benches of pine, falling to pieces, six chairs of the same shape, some of them without backs, two ordinary tables, two plain bedsteads, with pine slats, and a big copper kettle burned and battered. The above comprises all of the furnishing the said General Don Juan Ignacio Flores found in the palacio real, with ten keys to the apartments and chambers, and in official proof thereof we submit the present statement, by virtue of the request of the said Governor and Captain General, Don Felix Martinez, and which we sign, together with the secretary of the cabildo, and seal it with the seal of the arms of the Kingdom.

Done at the Villa of Santa Fe, on the thirteenth day of the month of July seventeen hundred and sixteen, and on this ordinary paper because no
stamped paper is to be had in these parts.

Juan Garzia de las Rivas
Francisco Lorenzo de Cassados

The well which Don Felix Martinez probably ordered dug, and which is described in the above translation, is discernible today. It is situated in the east central part of the Palace of the Governors patio. It is easily four varas wide from surface appearances, but the depth can only be determined by future excavation. It is certain to be partially destroyed, since the roots of a large willow tree planted by Huddleson in 1930 extend over part of the feature.

After the late Frederick Webb Hodge retired as Director of the Southwest Museum in Los Angeles, he moved to Santa Fe. One morning, shortly after he came here, I asked him what he knew about this large well. I showed him a handful of potsherds I had collected from the general area, explaining my interest in Palace history. However, at that time I was unaware of the 1716 archive concerning the Palace and its patio. But I did feel sure such a well would have been dug sometime shortly after De Vargas' reconquest of New Mexico, perhaps about 1693-96. "The Spaniards," I said, "would not have been stupid enough to allow a recurrence of the 1680 water fiasco." I then pointed to the southwest corner of the Palace patio where it was said there was a buried well containing viable water at least up to 1916. Hodge confirmed this, and then went on to impart a piece of very interesting information regarding the large well where we were standing. He said, "I don't know what is at the bottom of this one, but I remember that when Bradford Prince of the Historical Society discovered that he had been buying up a large quantity of spurious anthropomorphic figurines from a Cochiti Indian who had been making them, he had most of the remainder dumped right here. That's the first thing you ought to find."

There is a map published in 1869 which depicts the Palace of the Governors and its patio, and which shows how they looked in 1868. Only one well is shown, and it is in approximately the same place as the one ordered dug in 1715 (Fig. 1).

Well I in the southwest corner of the Palace patio obviously postdates the large well, since it is not shown on the 1868 map, but both have played their part in Palace history.

In the mid-1950s, I requested permission to excavate both of these wells. However, I was only allowed to dig the one in the southwest corner of the patio, the reason for the refusal to excavate the 1715 structure was that its size posed a danger! I was somewhat disappointed, but felt that the results of digging Well I might be of sufficient historical importance to permit work on the larger one (Fig. 2).

A sturdy scaffold, with pulley and bucket, was made, and on May 9, 1956, excavation of Well I began. Plans were also made to reconstruct and stabilize the feature so that it could become an exhibit for the patio (Fig. 3).

The crew consisted of Roy Ghent, Bennie Valdez, Sallie Wagner, and myself. We at once began to encounter black dirt and large boulders which, according to Ghent, had been put here in 1930-31 when the late E. L. Hewett, Director of the School of American Research and Museum of New Mexico, noted that the patio was developing a sunken spot. He ordered Huddleson and Ghent to take fill from the northwest center of the patio and correct the sinkhole. The well is said to have had viable water in 1909 when the Palace became the first unit of the Museum of New Mexico. The first few feet of fill we encountered post dated 1916, for in that year Hewett ordered Jesse Nusbaum, a curator, to fill the well which was no longer.
Plan of the PALACE of the GOVERNORS

Plan of the Palace of the Governors showing use of rooms in September, 1868. Solid walls indicate repairs and new construction made 1867-1868. (From photostat of original in National Archives, filed with letter from Henry S. Martin, Special Agent, to the Secretary of the Treasury, January 16, 1869.)

Figure 1. Plan of Palace of the Governors and patio in 1868.
In Ellis, B.T., N.d., The Historic Palace of the Governors, Museum of New Mexico
Figure 2. Southwest corner Palace of the Governors patio before excavation of Well I. Photograph, Museum of New Mexico.

Figure 3. Excavation in progress. R. Ghent kneeling, Marjorie Lambert standing, and Bernie Valdez at right operating pulley. Photograph, Museum of New Mexico.
needed. A layer of sandy soil and rocks began to appear at approximately four feet below the ground surface. A broken glass inkwell was removed at this level (Fig. 8).

By May 11, the shape and nature of the well became clear (Fig. 4). It had been constructed of well-laid cobblestones, was circular in outline, and had been sunk in a slightly larger well, also of cobblestones. Between the well of the earlier structure and Well I, a Puebla Polychrome sherd was removed at a depth of ca. four and one-half feet; although not conclusive this was the only evidence of Spanish contact encountered. It is possible that the earlier well had partially collapsed and that the smaller one we dug was intended to take its place. Portions of the smaller well had also collapsed, in one place to a depth of 7 feet. Animal bones and a chicken bone were encountered at a depth of 9 feet. Between 9 and 11 feet below ground surface, fragmentary glass, metal, and Indian manufactured potsherds were encountered.

We began to note a small amount of water at 15 feet, and at 16 feet, clear, clean water was encountered, and the bottom of the well was determined at 17 feet, with the walls of the well ceasing at this level also. The well measured slightly less than 3 feet in diameter. As soon as the excavation was completed, stabilization and restoration began, and by early June, 1956, the work was finished. Since no examples of a Territorial Period wellhouse could be located in photographic records of the Palace of the Governors, nor elsewhere, we decided to make a simple adobe curbing for the well. A heavy cover of wood was made to resemble similar well tops known to have existed throughout New Mexico in the nineteenth century, a crossbeam of juniper was added to provide a for pulley, rope and wooden bucket (Figs. 4 and 5).

CULTURAL MATERIAL

In many of the historical sites of this country, two of the richest sources of items pertaining to the daily lives of the inhabitants are wells and latrines. For example, many of the 23 or more wells examined at Jamestown, Virginia, produced much valuable data pertaining to seventeenth century occupation there. Recovered material consisted of ceramics, glass, leather, metal, and some wood (Cotter 1958: 152-159). No doubt if the early wells of Santa Fe could be located and excavated, local history would become considerably enriched. As far as can be determined, no effort has ever been made to excavate the Palace of the Governors latrines, although the location of some of them were shown on the 1869 Territorial period map. Huddleston once stated that latrines extended westward to Lincoln Street.

MAMMAL AND BIRD BONES

1. The area on the north, northeast, and northwest sides of the well produced the following: 3 goat or sheep bones (2 leg, 1 rib); 2 rib and 2 pelvis bones of bovine or horse, plus 4 unidentified bone fragments of large animals. Depth ca. 1'-3'.

2. Depth 10'-11' produced additional bones. These were: 1 horse tooth; 4 fragments of large animal bones, bovine or horse, goat or sheep bone, and 2 chicken bones.

3. Between 16'-17' the rib of a large animal (horse or bovine) and a chicken bone were removed.

METAL ARTIFACTS

Metal artifacts began to appear between 10 and 11 feet below the well surface. These were:
Figure 4. Restoration in progress. Photograph, Museum of New Mexico

Figure 5. The well restored. Photograph, Museum of New Mexico
1. A lead bullet and shell, about 50 calibre, late nineteenth century (Fig. 7).
2. Two fragments of iron stove.
3. Four well-preserved horse-shoes and fragments of several others.
4. One piece of bailing wire.
5. Five fragments of iron band (Fig. 6c). Since these have 3/16" holes, all about 1-5/8" apart, they are probably fragments of a heavy door or chest/trunk reinforcements (Figs. 6a,b, and c).

6. Fourteen nails, some of which were square headed, ranged in length from ca. 1 to 4 inches. A single upholstery tack also appeared along with other metal artifacts at levels 10'-11' below ground.

Metal artifacts also occurred at depths of 14 and 15 feet below ground surface, and included:
1. Lead bullet, about 36 calibre, and dating approximately 1865-1880.
2. Two fragments of an iron cook or heating stove.
3. Two pieces of an iron band similar to those removed from levels 10'-11'.
4. Nails: four with round heads; one with a square head. They range in length from 2-3/4" to 4-5/8".
5. An interesting metal fragment removed from the bottom of the well, 17 feet deep. Of it, Dr. John Wilson had this to say, "The only thing that I can think of—and I may be very wrong here—that this resembles is a keyhole escutcheon. This would be what the key fits into as a lock in a chest. It isn't complete and if we had more then it might look like something else. Although it is heavily pitted this is no guide to age with iron. The one side is quite flat and the thickness seems to be (or have been) uniform, which suggests that it was commercially made, stamped from a piece of sheet iron stock. It could easily be the same age as the glass artifacts." (Fig. 7, top row, right).

POTTERY

Twenty-five sherds comprised the total from this excavation.

Non-Indian Sherds: Three small pieces of white China, too small for positive identification, came from the 10'-11' level, and another was in the top fill just below ground level. A single Puebla Polychrome sherd was the only indication of Spanish contact, but evidence is inconclusive.

Pueblo Indian Pottery: Two glaze decorated sherds, one a Pecos Glaze V, and the other a Kotyiti Glaze VI, were located at a depth of between 10 and 14 feet in the well. Both examples dated well into the late seventeenth century, and probably were remnants from the 1680 Anasazi occupation of the Palace of the Governors. Matte painted ware also occurred. There were three pieces, one of which was Puname Polychrome, and the other two, although too small for positive identification, belonged in the Tewa tradition category.

Two bowl bottoms, parts of matte painted ware, originated in the Tewa area of the Northern Rio Grande Valley. They were of a type commonly found in sites of 1680 and beyond. A small polished Redware bowl fragment was also of the same general type.

Three culinary, or utility ware sherds, nearly all of which were micaceous tempered, were also manufactured in the Northern Rio Grande Tewa or Tiwa areas.

Since nearly all of the pottery removed from Well I came from depths of 10'-14', they may have been in soil which Nusbaum dumped there ca. 1916.

GLASS

Dr. John Wilson of Las Cruces, New Mexico, has been of invaluable assistance in the analysis of glass
Figure 6a, b, c.

a) top row - horse shoe examples
b) lower left - remains of iron stove
c) lower right - metal bands from door, chest or trunk. Collections Museum of New Mexico. Photo by Nancy Hunter Warren.
Figure 7a,b.
  a) top row, left to right—bullet and shell, upholstery tack, and keyhole escutcheon;
  b) lower row—examples of nails showing range of types and sizes. Collection Museum of New Mexico. Nancy Hunter Warren photograph.

Figure 8. Ink well. Collection Museum of New Mexico. Photograph by Nancy Hunter Warren
fragments from this well. His comments (letter, June 6, 1983) helped bear out my final conclusions regarding the well.

The two most complete pieces consist of the neck fragments and part of the body of a heavy glass ink bottle, and a cologne bottle (Figs. 8 and 9).

The body of the ink bottle was removed from a depth of ca. 4 feet. Its neck fragments were several feet below this level. Wilson said:

1. The clear glass ink well.
The two flared-rim pieces were wrapped separately but they do fit on the broken neck of the body. Ink and mucilage bottles had virtually the same forms, but since this appears to have been a desk-top item, ink well is almost certainly the proper identification. It appears to have been free-blown; that is, not made-in a mold. The profiles of the side are just slightly asymmetrical, and there are no signs of mold seams. The neck and lip are symmetrical, however, and bear the faint horizontal striations that show that the lip was made with a lipping-tool. At one time this would have had a glass stopper. The lettering on the bottom probably read "PROPERTY OF THE DEP'T" and the missing word may well have been "QUARTERMASTER," "Q' MASTER," or the name of some other U.S. Army department that processed a lot of paperwork. The most similar example to your specimen that I find is Fig. 19 (p. 55) in Robert M. Serskovitz' Fort Bowie Material Culture, which is No. 31 of the Anthropological Papers of the University of Arizona (published 1978). I have not found a reference to another ink well with lettering such as yours on its bottom.

To judge by the use of the lipping-tool, the style and regularity of the lettering, the color and quality of the glass, there is no doubt but what this ink well post-dates 1880, and it may have been made so recently as ca. 1900. The lack of any staining suggests that perhaps it was broken in shipping or in any event before it could see use.

With access to the annual reports of the Secretary of War for the 1880s and 1890s, it might be possible to pin this ink well down precisely as to when it was introduced, assuming of course that it was an Army item (as I suspect). However, these reports are not available to me and there may not be a set in New Mexico [Wilson, June 6, 1983].

A rather charming cologne bottle, almost complete, has also been checked by Wilson who stated:

2. Your ED. PINAUD PARIS bottle would have been for a cologne or one of the similar products made by this company. I'm enclosing a couple of pages from June Eastin's Bottles West which will give you some background on the firm of Pinaud. Various bottles for this company's products appear to be common on western historical sites; Richard E. Fike's Handbook for the Bottleologist (1969) lists four styles of Pinaud bottles (p. 31) we see two Pinaud bottles, #251 (on page 74) and #265 (page 76). Both were found at Fort Union, N.Mex.

Your Pinaud bottle was blown in a two-part mold though the mold seams are quite faint. The lip was finished with a lipping-tool. Although the glass appears to be clear, if you look
Figure 9. Glass bottle shards. Collections Museum of New Mexico. Nancy Hunter Warren photograph.

Figure 10. Glass fragments. Upper row - left to right: jar, or bottle stopper; center - drinking glass, right - drinking glass or glass bottom; lower row - bottle shards. Collections Museum of New Mexico. Nancy Hunter Warren photograph.
through it in natural daylight there is a faint purple tinge. I suspect that if it sat out in the sun for awhile it would turn purple. And it would have had a cork stopper.

In my opinion the bottle post-dates 1880 and could have been made as recently as A.D. 1900 [Wilson, June 6, 1983; Fig. 9].

3. With respect to the flattened glass stopper for closure embossed KARL KIEFER PAT-ENED [sic], I can find no information to associate with this name. This piece of glass was the top or stopper for a wide-mouth bottle of some kind, but as to what the contents may have been I couldn't even guess. Since it is purple glass, it would post-date 1880, and prior to World War I (Fig. 10, upper left).

4. In the envelope marked "Well I - Palace of Gov's - Dept 10'-11' - 1 Bottle bot. - 1 sm. bottle frag. - 1 sm. bottle nk." are three pieces from probably two containers. The clear-glass base is from a well-finished piece, perhaps even free-blown. It also has a ground-down pontil scar. These features suggest to me that it is more likely the base from a water tumbler than from a bottle. The bottle collectors claim that pontil-scared glass containers are pretty much prior to 1860, and what we found during the Fort Fillmore (1851-1862) and Fort Sumner (1862-1868) excavations strongly confirms this claim. So, my estimate here is a water tumbler, manufactured some time in the 19th century but probably no later than the 1860s. The other two pieces, the partial neck and the fragment of a side and bottom, may well be from the same bottle. In this case the bottle form appears to have been a "round prescription, wide-mouth" according to the replica glass catalogs. It could have held some kind of medicinal spirits. The absence of a pontil scar suggests that it post-dates 1860. The mold seam (this bottle was blown in a two-part mold) goes part-way up the side of the neck, while the lip was formed by hand (i.e. not with a lipping-tool). These features suggest an age of 1870s-1880s.

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Although the water tumbler would have been made before the small bottle, the tumbler might well have continued in use for a longer time than the bottle before the two of them broke. It would be entirely appropriate to find both in the same archaeological stratum.

To judge by the glass, this well could have been filled as recently as A.D. 1900, and probably not more than ten years before that. The water tumbler base and the small bottle fragments are the only two earlier pieces but even so they date well into the Territorial period (Figs. 9 and 10).

In conclusion, Wilson, who with Stewart Peckham, excavated the well in the patio of the Padre Gallegos house on Washington Street in Santa Fe, said, "The stuff from your well looks earlier than that from the Padre Gallegos well" (June 6, 1983).

In addition to the above glass described by Wilson, several fragments of window panes appeared in the 1916-1931 levels.

Stalactite, an Indian Amulet: Many similar specimens, both prehistoric and recent, regularly comprise part of a cacique's esoteric paraphernalia. They are used in rites pertaining to magic and curing, and for increase and fertility.

Such geological specimens as this are much favored as an amulet, or fetish, by the Anasazi, and we may assume that this one probably found its way into the Palace of the Governors during the Pueblo occupation of the Royal Houses. The stalactite is cone-shaped, showing some rubbing at both the painted end and base. A break on one side of the tip is perhaps the reason why the amulet was discarded and thrown out with refuse into the patio (Fig. 11).

In Well I, it was removed from between level 10'-11' in depth. It was probably in the dirt dumped there in 1916 by Nusbaum.

FINAL REMARKS

To support the cartography of the 1868 Palace map showing only one well in the east central end of the Palace of the Governors patio, the excavation conclusively demonstrated that Well I, southwest corner of the patio, was constructed after that date.

Its contents also supported statements made by the late Sam Huddleson and Roy Ghent, first, that the water in the well was viable in 1909, and that by executive order it was filled in 1916, and again in 1931.

Since it is known that the large well in the east end of the Palace was dug in 1715, it might be of equal importance to know the circumstances surrounding the construction of the new well in the 1860s. However, the well appears to have been used for only about 41 years.

The horseshoes, bullets, some of the miscellaneous metal, and the horse bones and tooth are probably artifacts belonging to the United States military occupation of the Palace environs. Glass and china, for the most part, are also reflective of both the military and other Territorial Period occupants of the Palace and its vicinity, while the Pueblo Indian fetish and potsherds are a reminder of the 1680 uprising when the Anasazi people took over the Royal Houses, living therein for 12 years.

The difference in the nature of the well fill can easily be explained. Nusbaum, in charge of Palace renovations in the forepart of this century, would no doubt have had sand hauled into the patio for making cement, using some of it when the order to fill the well was given in 1916. The darker 1931 soil used to fill the sink hole was also readily available. Thus the artifacts recovered indicate what may be considered part of the Palace of the Governors' history, but only in the broadest sense.

There still remains much to learn
of Santa Fe's long history. When the recovered materials from a recent Museum of New Mexico excavation north of the Palace are processed further light will be shed on many years of occupation in the near vicinity (Schaafsma 1983). Perhaps one of the most enlightening aspects of the Palace of the Governors' early eighteenth century years will be revealed when the large well shown on the 1868 map is uncovered. Hopefully it will contain artifacts which date to the post-1696 De Vargas period and beyond, thus establishing the structure as the one which the Governor General ordered dug in 1715. It must have been in use well into the nineteenth century. If so, this can also become an established fact.

Finally, there seems to be an increased interest in the folk art of the Cochiti Indian who set up a "rain god" and effigy manufacturing facility in his pueblo, and who first brought his idols to Bradford Prince and Jake Gold, both of Santa Fe, New Mexico. The Indian buried his work at the site of old Kotyiti on his reservation to antique them. Word of his discovery of many fetishes spread beyond Santa Fe, and collectors, including a number of well known museums eagerly bought many of them.

The present interest comes largely from the fact that specimens in the Indian's original style continue to turn up in collections, at auctions, and elsewhere. Mention is made of this because the 1715 well is said to contain some of Prince's purchases from the Cochiti man for the Historical Society of New Mexico.

According to Sam Huddleson, he personally removed a few when he planted a willow tree in the vicinity of the well in 1931. However, there remains a possibility of finding more of the so-called genuine Indian-made fakes and forgeries.

The story of this enterprising Cochiti man and his cleverly antiqued archaeological discoveries has become part of the folklore of the Palace, the

Figure 11. Stalactite: Indian Amulet - a type commonly used in rites pertaining to magic and curing, or increase and fertility. Collections, Museum of New Mexico. Nancy Hunter Warren photograph.
Historical Society of New Mexico, and Santa Fe.

Santa Fe, New Mexico

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FOOTWEAR ON NEW MEXICO'S HISPANIC FRONTIER

MARC SIMMONS

Many topics relating to domestic life in Hispanic New Mexico await serious study by scholars. One of the most important is the subject of costume, which, despite its obvious importance, has been largely neglected. Types of clothing used by Hispanic pioneers, changing styles, and materials and methods employed in manufacture need to be carefully researched. A brief look at one part of the Spaniard's costume—his footwear—may point the way toward future studies in this area.

Colonial records show that shoes, boots, and slippers, many of them produced in the Spanish leather-working center of Córdova, were common imports in New Spain from the days of earliest settlement (Torre Revello 1943: 780). By the mid-sixteenth century, shoemakers were well-distributed throughout central Mexico. The burgeoning herds of cattle provided an ample supply of hides for the making of footwear and for all other trades requiring leather.

Although locally made shoes and boots were readily available, persons of wealth and status continued to wear products from Spain whenever possible. Among surplus goods taken to New Mexico in 1598 by Juan de Oñate, for example, were 251 pairs of Córdovan shoes, 6 pairs of Córdovan boots, and 20 pairs of Córdovan buskins (that is, laced half-boots). Added to these was a considerable quantity of Mexican-made footwear, both single- and double-soled and with uppers of buckskin or calfskin (Hammond and Rey 1953: I, 218). Curious to note, in this period each shoe and boot in a pair was made like its mate with no allowances for differences in the right and left foot (Cisneros 1971: 6).

An inventory of two country stores prepared in 1641 at Parral, Chihuahua, showed that a good supply of Córdovan footwear as well as shoes and boots from Michoacán were on hand. Thus, New Mexican merchants, who were accustomed to do business in Parral, could choose from articles made either in the Old or New Worlds (Boyd-Bowman 1972: 244, 248). By that time, however, a local shoemaking industry was beginning to emerge on the upper Rio Grande and while the products seem to have been primitive, even by standards of the period, they filled the need for cheap footgear among a poverty-stricken populace.

In 1663 when the notorious New Mexican encomendero and alcalde mayor Nicolás de Aguilar appeared before the Inquisition in Mexico City he was dressed in "a doublet of white cloth embroidered with blue wool [and] trousers of dark red flannel with small points of black wool lace." Clearly, those were articles of dress manufactured in Mexico or perhaps even Spain. But on his feet Don Nicolás wore "shoes of buckskin from New Mexico." Included in an itemized list of his personal effects was reference to, "one pair of shoes of Córdovan leather, worn out" (Hackett 1937: III, 139).

In those few words we are conveniently provided a summary of the situation regarding footwear in New Mexico. Spaniards brought their fine imported shoes with them to the frontier and, when time and wear had rendered them no longer serviceable, they were exchanged for rudely-made local products. Rare was the individual who could afford the new and costly footgear carried hundreds of miles up the camino real. Perhaps others, like Don Nicolás, kept their worn out Córdovans as a reminder of more prosperous days.
By the eighteenth century, shoe-making had emerged as a full-blown cottage industry in New Mexico. The 1790 census, for example, showed 13 shoemakers resident in Albuquerque alone and additional ones living in surrounding villages (Olmstead 1975: 2-14). Although most or all of these tradesmen may have done some farming on the side, as was customary in New Mexico, plainly the census taker recognized the production of shoes as their primary occupation. But what kind of shoes were they making? And where were the products of so many specialized workers finding a market?

While the records are spotty, the weight of evidence suggests that New Mexican-made "shoes," in fact, were a highly distinctive type of moccasin, called teguas (or tewas), whose design was borrowed from the Pueblo Indians. At first glance, it would seem that the word was taken from the name of the Pueblo language group north of Santa Fe, the Tewa-speakers. Seventeenth century documents, however, demonstrate that the original term was tecoas, apparently an Indian word of unknown origin, later corrupted to teguas. When Santa Fe's Captain Andrés Hurtado used tecoas in a written declaration of 1661, he felt constrained to define it (as, "pieces of dressed leather which the Pueblos use for footwear"), indicating that the term was a localism (Hackett 1937: III, 188).

Early ancestors of the Pueblos had relied principally upon woven yucca sandals, but apparently sometime after A.D. 1300, hide moccasins came into vogue (Underhill 1954: 102). Diego Pérez de Luxan, a chronicler of the Espejo expedition to New Mexico in 1582, remarked that, "They [the Pueblos] wear shoes of tanned buffalo leather and tanned deerskins fashioned like boots" (Hammond and Rey 1966: 172). Similarly, Antonio de Espejo's own account stated, "Everyone, man or woman, wears shoes or boots with soles of buffalo hide and uppers of dressed deerskin" (Hammond and Rey 1966: 220).

The soles were made from the thick back skin of the buffalo. They were cut a half inch or so larger all around so that the edges could be turned up. The buckskin uppers were sewn to the edges of the rawhide sole using sinew and an awl. Those uppers could be formed of a single piece of skin with a flap that wrapped around the ankle and closed with a thong or button. Or they could be made in two pieces: a vamp that covered the toes and instep, and a separate heel section. This sort of mocasin, with variations on the basic design and in the coloring, is still regarded as traditional footwear among the Pueblos (Wright 1979: 21-22). Essentially the same type of mocasin is common to the Navajo, Paiute, and Walapai (Underhill 1954: 102).

By the latter eighteenth century, if not before, the majority of the New Mexicans were shod in teguas, like their Indian neighbors. Hispanic shoemakers introduced some minor stylistic changes, seemingly to give the product more the aspect of a European shoe. But essentially, it remained a mocasin.

Raw materials were plentiful since buffalo hides and tanned buckskin (gamuza) were two of the most common products of the province. Moreover, the tools required to produce a pair of teguas were minimal—an awl, a knife, and a sharpening stone. The first colonists must have gotten their footwear directly from the Indians, but in time, after the wearing of teguas became commonplace, Hispanic makers were attracted to the trade.

The relatively large number of shoemakers at Albuquerque and elsewhere in the province did more than meet the local demand; they produced teguas for export to the mining communities of northern New Spain. New Mexican-made mocassins as well as
Figure 1. A pair of New Mexican tewas (accompanied by a blow horn and rawhide case). Credit: Museum of New Mexico.

Figure 2. The tewa-makers of Cochiti Pueblo, ca. 1920. Credit: Museum of New Mexico.
Figure 3. Awls of bone and antler handle, of the type used in making tewas.
stockings were popular items all along the Hispanic frontier. With the moc­
casins also went the name, so that even today, tegua is the common term throughout northwest Mexico for a crudely made shoe (Bentley 1973: 206; Schipman 1970: 80-82).

Up to the time of United States occupation of the Southwest in 1846, teguas, valued at one peso per pair, continued to be shipped over the Chihuahua Trail to markets in the south (Treasury Records 1844). At that late date, and for several decades afterward, New Mexicans persisted in wearing them, mainly for reasons of economy. Susan Magoffin reported that a few persons could afford leather shoes brought over the Santa Fe Trail from the East, "but most have buckskin mockersins [sic], Indian style" (Drumm 1962: 95). At mid-century, lawyer William W. H. Davis observed: "A large proportion of the peasantry in the country still dress in tanned deer-skin, and wear moccasins upon the feet" (1938: 62). Only after arrival of the railroad in 1880, which allowed importation of inexpensive footwear from New England factories, did teguas begin to fade from the scene.

During colonial days, New Mexico's rural folk often wore a pair of leather leggings, called botas de alas, in conjunction with their teguas. These were simply wrap-around pieces of buckskin or leather, tied just below the knee with a separate thong or cord (the atadero), and usually folded over at the top to form a cuff. Since short, knee-length breeches were the custom through the Spanish period and into the nineteenth century, the leggings were necessary like gaiters, to protect the lower leg when riding. Even after long trousers began coming into fashion about the opening of the Mexican era (1821), botas remained in use, being tied over the pants' leg. This style of leggings was adopted by the mountain men and other American frontiersmen.

Many botas were left a natural color and undecorated, although it was not uncommon to find them darkened to a rich brown by smoking over a fire made of willow roots and corn cobs (Echevarría and Otero 1976: 182). Upper class horsemen in New Mexico, however, sometimes went to great lengths in providing their "leggins" with ornamentation. Of the fancy type, merchant Josiah Gregg commented: "Then there are the botas which somewhat resemble the leggins worn by the bandits of Italy, and are made of embossed leather, embroidered with fancy silk and tinsel thread and bound around the knee with curiously tasselled garters" (1954: 149-150). Such splendid articles of apparel, no doubt, appealed to the horseman's vanity.

Finally, there is the matter of hosiery on the Hispanic frontier. The Oñate colonizing expedition brought to New Mexico a surplus of 94 pairs of coarse woolen hose, in a variety of colors, and for both adults and children (Hammond and Rey 1953: I, 132). References to stockings occurred fairly frequently in the early colonial years—the aforementioned Captain Aguilar, for instance, owned white cotton stockings and woolen stockings of red, blue, and buff-color (Hackett 1937: III, 139).

Rather quickly, hosiery, like teguas, developed as an important product of the province. Widely used domestically, stockings were also exported by the hundreds to mining centers in Chihuahua and Sonora (Scholes 1942: 45). A clue as to the sort of stockings that figured in this trade is provided by Father Ignaz Pfefferkorn, a Jesuit missionary serving in Sonora during the mid-eighteenth century. He mentioned that the common stocking seen in that region was "footless, ending at the heel." And, he added, "the toes and the front of the foot would remain bare except that the Spaniards wrap
the bare part with red cloth, which then shows through the slits cut in the uppers of the teguas, and ... beautifully decorates the foot. Over the cotton stockings, instead of boots, they wear a kind of deerskin legging [that is, botas de ala]" (1949: 286-287).

Since Father Pfefferkorn made pointed reference to "footless stockings," it may well be he had not seen such strange articles of apparel until his assignment to the frontier. Indeed, it appears that such hosiery (what are now called "tube stockings") was a specialized product of New Mexico, carried south by commerce to the mining communities where a good market existed.

The tall, footless stocking, so familiar to frontier Spaniards, probably had its origin among the prehistoric Pueblo Indians. Martin and Plog (1973: 201) showed an Anasazi pair from Butler Canyon, Utah, which was reported-ly made "by means of the coiled net-ting method from human hair yarn." The first European colonists, finding similar hosiery of cotton among the historic Pueblo, would have picked it up along with the teguas.

One of the tasks assigned to Indian women who were forced to work in Santa Fe sweatshops during the pre-revolt period was that of making stockings, which unscrupulous Spanish governors exported for their own profit. While the basic native form of the footless stocking survived, it is likely that during this period the Indian workers were introduced to the European technique of knitting (replacing prehistoric finger weaves). At least we know that stockings of the same design, but dating from a later period, were all knitted.

Indeed, footless stockings are still made and worn among some Pueblos (particularly the Hopi and Tewa) and the Navajo. The latter, who are thought to have acquired knowledge of stocking manufacture from the Pueblos, until recently used wooden knitting needles (Franciscan Fathers 1910: 255; Kluckhohn, et al. 1971: 262-263). Predominant colors today are aniline dyed dark blue and black (Rodee 1977: 133).

Traditionally, Indians have worn the footless stocking so that the area from the knee to the instep is covered, but the toes are left exposed. That the Spanish colonists followed the same custom is illustrated by several nineteenth century bultos. The saints, such as the San Rafael preserved at the Santuario de Chimayo, wearing only tall black stockings on their feet, all have bare toes.

When Lieutenant James W. Abert encountered a party of poor Comanches from Taos on the plains in 1845, he described them as wearing, "large bag breeches extending to the knee, long stockings and mocasins" (1970: 42). The stockings, used with teguas, served a similar function as the botas, that is, they protected the bare legs when short pants were worn. But in many instances, stockings and botas were worn at the same time, providing added warmth in winter.

While the subject of footwear represents only one small aspect of Spanish colonial material culture, it is, nevertheless, significant in reconstructing a picture of early New Mexican folkways.

Cerrillos, New Mexico

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Figure 4. Tewas collected in Pimería Alta, probably imported from New Mexico. These have been modified to resemble sandals. Or perhaps, as Pfefferkorn suggests, the slits were cut to allow the red cloth, worn inside to show through. Credit: Arizona Historical Society Library.
Figure 5. A bulto of San Rafael, Chimayo, wearing the black, open-toed stockings characteristic of Hispanic New Mexico. Credit: Museum of New Mexico.
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Thousands of Indian and Anglo visitors gather annually at Zuni Pueblo in late November or early December to watch the final portions of the Sha'lak'o ceremony. For weeks the peoples of the Southwest have been asking, "When's Sha'lak'o? What time should we be there?"

This study lists the chronology of the events of this complex kachina ceremony, gives an analysis of when the ceremony has been held for the past 100 years, and the final section is a chronology of significant incidents and visitors associated with the ceremony.

Sha'lak'o is a year-long series of religious events, starting at the end of the winter solstice and continuing to within a few days of the next winter solstice. The portion of Sha'lak'o attracting the large number of watchers starts on a winter afternoon, continues through the night, and ends the following afternoon.

The Sha'lak'o ceremony has been the subject of numerous anthropological studies, of hundreds of magazine and newspaper articles, of poetry, and of a popular mystery novel. The French anthropologist, Jean Caze- neuve, devoted an entire book to it and said, "Le spectacle du Sha'lak'o dansant est toujours suprenant," (1957: 175). The Zuni Tribal Historian (Napetcha 1976) commented about the ceremony as follows: "Zuni, like all other tribes, performs masked ceremonials to give thanks to the Creator for the many blessings He has granted to them during the past year, and ... they ask for the continuation of these blessings."

At the end of the Zuni winter solstice ceremonies, the groups of people to be involved in the year-long series of Sha'lak'o events are chosen: (1) the Longhorn or Saya:dasha (saya, horn; dasha, long) kachina group. It includes the leader Saya:dasha, Shulawitsi (the Fire God), Hududu, and two Yamuhakto. Two Salamobia accompany the group. (2) the Mudheads, or Ko:yemshi, a group of 10 ritual clowns. (3) the Sha'lak'o impersonators, two members from each of the six kivas (called kiwitsine at Zuni) are chosen. Each kiva organization has a Sha'lak'o kachina mask, a 9-foot tall, bird-like kachina with a snapping beak. In Zuni mythology, the Sha'lak'o are the messengers of the Gods of Rain. (4) the Zuni families who are to remodel or build new houses where the final ceremonies are held at the end of the year. (5) the religious leaders. These leaders have the continuing duty, year after year, of teaching the Sha'lak'o participants their duties and the litanies recited in the ceremonies.

Saya:dasha and all the impersonators plant prayer sticks (telikina'we) at shrines outside the village.

On the day of the 10th planting
of telikinawe, the October full moon, Saya:dasha and Ko:yemshi Awantachu (leader of the Mudhead clowns) are each given a cotton string (pile) with 49 knots. Starting the next morning, one knot is untied each day.

Ko:haiito, 10, 20, 30th Knots Untied

During this period of counting, Ko:haiito (ko, god; haiito, determined), telikinawe are planted every 10 days. All the impersonators are working on the ceremonial houses.

40th Knot Untied

Telikinawe are planted. In the evening, the Ko:yemshi make announcements in each of 4 plazas, saying the Saya:dasha group will come in 4 days and the Sha'lak'0 in 8 days. The announcements are often misleading and are always humorous. If the ceremony is to be postponed because the houses are not finished, the Ko:yemshi do not appear, and the untying of knots is stopped until they do come out and make the announcements.

44th Knot Untied

In the evening, the Saya:dasha group plants telikinawe and Shulawitsi lights a series of bonfires with his firebrand as the group enters the village. They and the Sha'lak'0 impersonators go into retreat.

48th Knot Untied

The Sha'lak'0 arrive. Thousands of visitors descend upon Zuni Pueblo. Listed below is the chronology of the events associated with the coming of the Sha'lak'0 to the village. The chronology contains the time of day and the year the events were seen by the following observers (name and year seen): Bourke 1881; Magill 1883; Parsons 1915; Gallup Independent 1939; Coze 1953; Lyon 1973, 1974, 1975; Lange 1982.

1953 (2:35pm); 1973 (2:45pm); 1974 (2:53pm); 1975 (3:15pm)

Shulawitsi and his ceremonial father cross the causeway. He carries a lighted torch and sprinkles meal in six holes located around the village. They complete their counterclockwise circuit and cross back to the south side of the river.

1881 (mid-day); 1883 (4:00pm); 1939 (late pm); 1953 (3:00pm); 1973 (3:20pm); 1974 (3:21pm); 1975 (4:00pm); 1982 (3:00pm)

Shulawitsi and his father lead the Saya:dasha group across the causeway. Shulawitsi rapidly plants telikinawe in each hole and goes to the house reserved for the Saya:dasha party. The Saya:dasha kachinas conduct elaborate ceremonies and plant telikinawe at each of the six holes. They go to their house and conduct house-blessing rites. Singers start their chants. The Saya:dasha kachinas and the religious leaders begin their litanies.

1881 (sunset); 1883 (sunset); 1915 (5:00pm); 1939 (sunset); 1953 (6:30pm); 1973 (5:30pm); 1974 (5:30pm); 1975 (5:40pm); 1982 (5:00pm)

The six Sha'lak'0 appear on the south side of the river. Eventually they cross the causeway and the masks are left on the north bank of the river for a period of time. The Sha'lak'0 dancers slip out from under their masks screened by blankets held by the numerous attendants. They are also partially screened from view by corrals and wood piles.
The Sha'lak'o are reactivated. One of the paired Sha'lak'o impersonators, the alternate, carries a basket of telikinawe and leads his Sha'lak'o and a group of singers to their ceremonial house.

The Sha'lak'o mask is brought into the house and deposited in the corner next to the altar. The house is blessed. Litanies are recited. The Ko:yemshi appear at the door with masks thrown to the back of their heads. They sing, joke, and make humorous remarks about individual villagers.

Baskets of food are brought into each of the ceremonial houses and presented to the religious leaders and the impersonators. Food is folded into wafer bread, hewe, and taken outside and buried as an offering to the koko (gods).

All participants and visitors are fed a stew of posole and lamb, fresh Indian bread, coffee, jello, powdered salt from Zuni Salt Lake. The time of these events will vary somewhat for each of the ceremonial houses.

Flute playing, chanting, and dancing start in all the houses. The singers are supposedly members of the same fraternity associated with the altar—not necessarily from the kiva group of the Sha'lak'o. The Sha'lak'o dances in place, snaps his beak, then makes a breath-taking run to the end of the room. Visitors watch from adjacent rooms or through windows and doorways.

Early Morning Hours

Special dance groups perform in the houses—Kumanche Dance in the 1970s. Some of the Ko:yemshi and Saya:dasha kachinas visit the Sha'lak'o houses and dance.

The dancing stops. Saya:dasha takes out his cotton rope and unties the last of the 49 knots. The women of the house wash the hair of the impersonators. All rest.

Each Sha'lak'o is escorted by a group of men across the causeway, and they stop in the field to the south of the Zuni River. The Saya:dasha group arrives perhaps as much as an hour later. Two groups of seven holes each are dug in the field—an eastern group and a western group of holes. The Saya:dasha group plants telikinawe and retires. The two Salamobiya warriors remain with the Sha'lak'o. The Sha'lak'o plant telikinawe, running from one group of holes to the next. Late in the afternoon they too depart, leaving the village and moving in a generally southwestern direction. The Ko:yemshi may dance on roof tops after the Sha'lak'o races. The major portion of the ceremonies seen by most...
visitors is finished.

Next Five Days

The impersonators receive many gifts from the tribe. There are dances in the ceremonial houses, starting about 9 or 10 in the evening. On the fifth day after the Sha'lak'o leave, the Ko:yemshi perform ceremonies. The villagers shower them with many and very expensive gifts: in the 1970s freezers, TV sets, blankets, etc. The Ko:yemshi leave in the evening after planting telikinawe and collecting traditional food for their journey. They have completed their duties for the year. The Molawia ceremony, performed by religious leaders and Corn Maidens, has been reported as being performed on this last day of the Sha'lak'o ceremony.

ANALYSIS

The following analysis is based on 73 years of data from 1879 to 1982: 5 years of data from 1879 to 1913 from accounts of visiting anthropologists; 68 years of data from 1914 to 1982, mostly from Gallup newspapers.

The scheduled time of the individual Sha'lak'o events during the final portion of the ceremony, as shown in the previous section, has been remarkably constant for the last 100 years.

The day of the month the Sha'lak'o arrived at the village ranged from November 19 to December 22 (Fig. 1). There appears to be no preferred day of the month, with November 27 having the highest percentage, 9.6%. The ceremony was held in December for 77% of the years for the period 1879-1982, and 76% of the years from 1958-1982.

The traditional procedure the Zunis use to schedule the events leading to the arrival of the Sha'lak'o is based on giving, sometime in October, cords with 49 knots to both Saya:dasha and Ko:yemshi Awantachu. A knot is untied each day thereafter during this period (Ko:haiito). The Sha'lak'o arrive when the 48th knot is untied and leave the next day when the 49th is untied. There is some confusion in the anthropological literature on the exact method used to determine the beginning of Ko:haiito, but there is a consensus that it begins in October. Stevenson (1904: 231-234) said, "each month in the last quarter of the moon, telikinawe are deposited ... (at the time of the 10th planting, the priests) tie 49 knots in a white cotton cord, denoting that the Gods will come in 49 days." Parsons (1917: 186) stated that prayer sticks are planted on the days of the 10 full moons after the winter solstice ceremonies, and on the day of the last planting Ko:haiito begins. Her ceremonial calendar for 1916 (1917: 151-160) showed that all the plantings associated with Sha'lak'o during the year were made on the day of the full moon or within one day thereof. Bunzel (1932: 707) said Ko:haiito may begin at the new moon or the full moon of October. Cazeneuve (1957: 130 and 136-137) said telikinawe are planted every full moon, and at the 10th, or October full moon, the religious leaders give Saya:dasha and Ko:yemshi Awantachu cords with 49 knots. The most direct evidence of the method of dating the start of Ko:haiito came from an October 12, 1886, letter dictated by Ba:lawahdiwa, governor of Zuni in the 1870s (Cushing 1886): "has the proclamation of the coming of the Sacred Dance been on the full moon of today?"

Based on the information of Parsons, Cazeneuve, and Ba:lawahdiwa, 73 years of available data were analyzed, relating the number of days between the October full moon and when the Sha'lak'o leave Zuni, i.e., the day the 49th knot is untied (Fig. 2). The ceremonies were held within 49±5 days of the October full moon 69.9% of the years. A difference of
Figure 1. Starting date of Shalako ceremony: 1879-1982, 73 yrs. of data.

Figure 2. Number of days between the tenth full moon of the year (October) and the date the Shalako kachinas leave Zuni, plotted as \((49 \pm X)\): 1879-1982, 73 yrs. of data. By Zuni tradition the difference is 49 days.

Figure 3. Day of week Shalako kachinas arrive at Zuni for the periods 1879-1957 and 1958-1982, 48 and 25 yrs. of data, respectively.

Figure 4. Number of houses used in the Shalako ceremony: 1879-1982, 32 yrs. of data.
49 days had the highest percentage, 17.8%. The ceremony has been performed more times after the 49th day than before. As yet no study has been published explaining why the Sha'lak'o events are associated with the phases of the moon or why the Ko:haiito period of counting is for 49 days.

If the dating of Ko:haiito is based on the 10th full moon after the winter solstice ceremonies, confusion as to the selection of the date can arise in those years when there is a full moon early in January, resulting in the 10th full moon in late September. There were arguments among the Zuni in 1896 and 1920 about the correct date for Ko:haiito (Stevenson 1904: 231; and The Gallup Independent 1920: Dec. 2). In both years the moon was full in early January. December 23, 1941, was the latest date the Sha'lak'o left, 1 day late based on a November 3 full moon. However, the ceremonies could have been postponed in 1941 because of the beginning of World War II or because Shulawitsi was arrested earlier in the month.

Figure 3 is a plot of percent of the day of week on which the Sha'lak'o arrive. There was no preference for day of the week in the period 1879-1957, but from 1958-1982 the ceremony started on Saturday 88% of the time. This present tendency to hold the ceremony on weekends probably is due to the availability, in today’s economy, of Zunis and visitors on these two days. The use of weekends has not really affected the "49-day rule" appreciably. The Sha'lak'o left 49 days after the October full moon 17% of the years between 1879-1957 and 20% of the years for 1958-1982. Comparable percentages for leaving within 49±5 days are 70.8% and 68%, respectively.

Figure 4 shows the number of Sha'lak'o houses used per year for the 32 years of available data. The average for the 1879-1957 period was 4.2 houses/year, and the average for 1958-1982 was 6.7 houses/year.

Special dance groups perform during the night of the Sha'lak'o ceremony. Of the information available on 19 nights, the Zunis usually performed their version of the Navajo Yeibetchai Dance from the 1880s to the 1960s. In the 1970s and early 1980s, the Kumanche Dance (masked Comanche) was often performed (Raymond 1960-1961). Other dances noted were: Jemez, Mulataje, Bluebird.

The dates for the full moon were obtained from the appropriate World Almanac or were calculated (Meeus 1962). Corrections were made for the seven hours difference in time between Greenwich Mean Time and Mountain Standard Time. The days of the week were obtained from perpetual calendar tables (World Book 1957).

CHRONOLOGY OF INCIDENTS AND VISITORS AT THE SHA’LAK’O CEREMONY

Note: The dates at the beginning of each paragraph refer to when the Sha’lak’o visited Zuni Pueblo for the year concerned.

Years Prior to 1879: Trappers visited Zuni Pueblo in the first half of the 1800s. Many of them were saved from starvation by the Zunis. George Yount (1966: 38) and party were there in 1826-1827 for three months. Franz Huning (Browne 1973: 51) saw either the Sha’lak’o or a winter kachina dance about 1851. He was told Spaniards and Mexicans were not allowed to see Zuni religious ceremonies. Perhaps this explains the lack of any descriptions of the Sha’lak’o ceremony in early Spanish documents. In the 1850s to 1870s, the Zunis were constantly visited by U.S. Army officers and by geographical and railway survey parties, but none described the Sha’lak’o ceremony. The Presbyterian missionary, T. F. Ealy, moved to Zuni in October 1878; he recorded the Sha’
lak’o ceremony as taking place, but he went to bed rather than attend the ceremony (Ealy 1878).

1879, Nov. 16-17 or Nov. 30-Dec. 1: The Smithsonian Expedition to the Southwest, headed by Col. James Stevenson, was at Zuni Pueblo. The confusion concerning the dates comes from the fact that Frank Cushing used the earlier date and Matilda Coxe Stevenson the later date (Cushing 1879; Stevenson 1904: 241). The first published account of the ceremony was made by Cushing (1882-83). It included drawings of a Sha’lak’o, a Salamobia, and the Ko:yemshi. Cushing introduced the terms Longhorn for Saya:dasha, Fire God for Shulawitsi, Hooter for Hududu, and mud-priests for the Ko:yemshi. Stevenson described the Saya:dasha group as the Council of the Gods, a phrase often used now by Anglos, but it is seldom used by the Zuni. John (Jack) K. Hillers was the photographer for the expedition. No Hiller’s photograph of the ceremony has been found to date.

1881, Nov. 26-27: The diary of Lt. John Gregory Bourke contains a 60,000-word description of Zuni at Sha’lak’o time (Bourke 1881). He used the now-popular term of Mudheads for the Ko:yemshi. Bourke made sketches and watercolor drawings of the various Sha’lak’o kachinas (Figs. 6, 7, and 8). At the request of the Zunis, Bourke used an axe to destroy a keg of whiskey brought to the ceremony by Isleta Indians. He documented an argument between the Zuni governor and Matilda Coxe Stevenson, concerning her standing in a prohibited area to watch the final portions of the ceremony.

1883, Dec. 2-3: Margaret Magill, sister-in-law of Cushing, lived with the Cushings at Zuni. She described the ceremony and made watercolor sketches of Zuni scenes, including several kachina masks (Magill 1883).

1886: Ba:lawahdiwa (also known as Patricio Pino) and two other Zuni men were with Cushing as guests of Mary Hemenway on her estate near Boston, Mass. Ba:lawahdiwa dictated a letter to Cushing on October 12, 1886: "My people, how are ye all? ... has the proclamation of the coming of the Sacred Dance been on the full moon of today? How many days are included in the count of the coming of the Sacred Dance? ..." Ba:lawahdiwa also said that they would return to Zuni if there were any difficulties whatsoever with the announcements made by the Mudheads, the coming of the Longhorn, or the departure of the Sha’lak’o. The letter (Cushing 1886) was written in both English and Zuni language versions, and Cushing sent it to the Zuni trader, Douglas D. Graham.

1896, Nov. 19-20: Matilda Coxe Stevenson described the 1896, 1891, and 1879 Sha’lak’o ceremonies in great detail (Stevenson 1904)—the first anthropological descriptions of the ceremony. Ben Wittick, a photographer from Gallup, was at the 1896 ceremony. His photograph "The Sha’lak’o Dancers Planting the Plumed Sticks" (Wittick 1896: #15068) showed Matilda Coxe Stevenson in riding habit and Princess Eugenie hat, standing close to three Sha’lak’o—again, as in 1879, she was in a restricted area (Fig. 5).

1897, Nov. 27-28: Wittick was again photographing the ceremony: "The Dance of the Sha’lak’o—Zuni Pueblo, November 28, 1897" (Wittick 1897: #47840). Obviously Wittick had to obtain permission to photograph the Sha’lak’o and to set up his large camera on a tripod. His photographs are among the earliest known of the ceremony. Matilda Coxe Stevenson was also photographing Zuni ceremonies in 1896-1897.
Figure 5. Matilda Coxe Stevenson, in riding habit, and companion watching the Sha' lak'o plant prayer sticks. She is on the south side of the Zuni River, looking to the east. Her presence in this same restricted area in 1879 precipitated an argument between her and the governor of Zuni. Wittick photograph, Nov. 20, 1896. #16068 Photo Collections, Museum of New Mexico, Santa Fe.
Figure 6. Sha' lak'o drawing by John Gregory Bourke, Nov. 26, 1881. Original watercolor drawing at USMA Library, West Point, NY.
Figure 7. Saya:dasha or Longhorn drawing by John Gregory Bourke, Nov. 26, 1881. Original watercolor drawing at USMA Library, West Point, NY.

Figure 8. Shulawitsi, the Little Fire God, drawing by John Gregory Bourke, Nov. 26, 1881. Original watercolor drawing at USMA Library, West Point, NY.
1914, Nov. 30-Dec. 1: A headline in the McKinley County Republican for December 5 read: "TO ZUNI. A large crowd from here (Gallup) went to Zuni Reservation last Monday where they attended the prayer dance given by the Zuni Indians." No newspaper accounts of the Sha' lak'o ceremony were found in the available Gallup papers prior to this date. From 1914 on, Gallup newspapers and other papers in New Mexico usually carried a story announcing the date of the ceremony.

1915, Dec. 12-13: Elsie Clews Parsons, anthropologist, was at Zuni and wrote an account of the ceremony (Parsons 1917: 183-215). There were 6 Sha' lak'o houses, and she saw the Zunis perform the Navajo Yeibetchai Dance, also seen by Bourke in 1881. The Zunis warned her to stay away from the field south of the river where the Sha' lak'o plant prayer sticks.

1916, Nov. 29-30: A calendar of the ceremonies held at Zuni in 1916 was published by Parsons, including all the full-moon dates when the Saya:dasha and Sha' lak'o parties planted prayer sticks (Parsons 1917: 151-182). The Gallup Independent, December 7, 1916, stated: "The Navajos were requested to stay away because of smallpox in Gallup ... The prohibition movement seems to be having its effect upon the Indians. Last year the deputies took away and destroyed 156 quarts of whiskey which the Navajos had brought with them to assist the spirit of the occasion. This year but three quarts of whiskey were taken from them ... Among the visitors from outside was W. G. Fields, a wealthy business man from Chicago" (one of the owners of Marshall-Fields Department Store).

1923, Dec. 7-8: The Gallup Herald of December 15 listed the visitors to the ceremony, including: Waldo Twitchell of Santa Fe, Elsie Clews Parsons, the Princess Ghika of Rumania, and Owen Cattell and his brother from the Museum of the American Indian, New York. The attempts of the Cattells to photograph the ceremony precipitated arguments and contributed to the factionalism then current among the Zuni. "Zuni and Isletan youths posted themselves before the camera and ruined most of Mr. Cattell's film" (Stephen 1936: 12). The incidents surrounding the attempts to photograph the 1923 ceremony were a part of the hearings conducted by representatives of the Bureau of Catholic Indian Missions and the Indian Rights Association: "The Cattell brothers thought they had it all fixed to take some moving pictures—a thing that Douglas Fairbanks had attempted to do three years ago and failed ... The Cattells took a few of them, and then set their camera in a conspicuous place ... The Priest of the Bow jumped in front of the camera..." (Zuni Hearings 1924).

1924, Dec. 2-3: Gallup Herald for December 6: "The ceremonies at Zuni were held before an immense crowd ... 300 white visitors ... over 800 Navajo ... Governor Nick of Zuni was telling us that the Shalikos of the last two years cost him around $800." The Gallup Independent of December 5, said, "The party from the Fox Film Corporation of New York City ... was composed of Miss Elizabeth Pickett of New York City, assistant editor of the educational division, G. O. Post of Hollywood, cameraman, and Ted Tetzaff, assist cameraman ... It was the desire of Miss Pickett to secure pictures of the Shalako Dance, but this was opposed by the Zuni chiefs and they were not obtained."

1925, Dec. 20-21: John Collier of the American Indian Defense Association inserted into the Congressional Record how, in his opinion, the Indian Superintendent at Zuni had usurped the management of the Sha' lak'o ceremony
from the tribal officers (Collier 1926). Apparently the superintendent had, through his subordinates, seized the tribal insignia some two years before. At the 1925 ceremony, the superintendent issued fake badges to a number of white men and Indians and according to Collier, "these wearers of the fake badges and swingers of clubs took charge of the Zuni Shalako. The tribal officers were pushed aside, and these men strode hither and thither ..."

1928, Dec. 17-18: Ruth Bunzel, anthropologist, was present for the Sha' lak'o ceremony. She published the Zuni origin myths that were recited at the Sha' lak'o ceremony (Bunzel 1932).

1929, Dec. 5-6: Witter Bynner, Santa Fe poet, published a poem about Sha' lak'o (1929).

1931, Dec. 16-17: The Gallup Independent of November 30, December 16 and December 17: "Shalako is put off until Dec. 17 by storm." Over 1000 Navajo Indians were caught on the mesas surrounding Zuni Pueblo by a heavy snow storm as they were picking pinon nuts. The Navajos were taken into Zuni homes until trucks could be sent for them. Final construction of the Sha' lak'o houses was delayed due to the storm and the rescue efforts of the Zunis. Only 400 attended the celebrations.

1933, Dec. 12-13: The Gallup Independent of December 13, stated that the visitors to the ceremony included one of the Gianini brothers, owners of the Bank of America.

1935, Dec. 10-11: From The Gallup Independent of December 2 and December 11: "The date (Dec. 10) became definitely known when it was learned that 10 knots remained in a calendar card entrusted to the Zuni Mudheads. The ceremony watched by more than 2,800 ... 800 white people saw the ceremonial ..."

1939, Dec. 13-14: The Gallup Independent of December 11, gave a complete schedule of events for the 13th and 14th and the following five days.

1941, Dec. 22-23: The Gallup Independent of December 20, page 1: "U.S. Fighting Forces Blast Japs ... Indians Converge on Pueblo for Shalako." The ceremony continued through the war years but with fewer visitors.

1946, Nov. 27-28: During the final planting of prayer sticks on the 28th, a Sha' lak'o fell. Newspapers around the state carried front-page headlines of the incident. The Gallup Independent of November 29: "The Indian spectators disappeared in an instant as the green masked Yamuhako [actually the Salamobia] gods dashed into the crowds to whip the people with staves of yucca to take away the bad luck."

1948, Dec. 1-2: Edmund Wilson, one of America's foremost litterateurs, saw the ceremony and wrote a perceptive article for the New Yorker (Wilson 1949).

1953, Nov. 30-Dec. 1: The Gallup Independent of December 1: "Governor Conrad Lesariley showed Independent staff members a page from a Denver newspaper which carried a story and two pictures of the Koshares, a Boy Scout Indian dance team at La Junta, Colorado. The photos were of inaccurate imitation Shalaksos and a group of Scouts dressed to resemble the Mudheads. The mock Shalako ceremony at the Boy Scout headquarters in La Junta, the Kiva, occurred Nov. 21 ... The governor declared that he was turning the matter over to the tribal attorney ... During Shalako dances last night, tribal officers picked up a tourist who was making sketches ... the woman and her party were ordered to leave the pueblo." Paul Coze, western artist, attended the 1951 and 1953 ceremonies. He published a chronology of the ceremony in his fully
illustrated articles in Arizona Highways (Coze 1952 and 1954). In addition, The Gallup Independent of November 22, 1940, had earlier reported that Paul Coze of Los Angeles was bringing 20 or more of Hollywood's movie colony to the ceremony.

1954, Nov. 27-28: The Gallup Independent of December 4: "Governor Teddie Weahkee welcomes you ... no cameras ... no sketching ... men must remove their hats when in the houses where the Shalako and Council of the Gods are ... no liquor ..."

1965, Nov. 27-28: The Gallup Independent of November 18: "Governor Robert E. Lewis issued an invitation for the public ... maps of the village, showing locations of the new houses where the dancing takes place will be available ..."

1966, Dec. 15-16: Clara Gonzales (1966) published a popular description of the ceremony. She was a retired Bureau of Indian Affairs educator on the Zuni Reservation.

1967, Dec. 2-3: The Gallup Independent of December 4: "Shalakos Dance at Six New Houses While Hippies Watch Ceremonies ... Hippies dressed in every imaginable variation of what they thought Indians should wear, men with scraggly three or four-day-old beards, unwashed and unkempt, they crowded in groups of 20 or 30 to watch in open-mouthed amazement the wonder of the ceremonies. Anthropology students, many of them from the University of New Mexico, also stood around in uncertain groups not quite aware of what was going to happen next and in many cases being confused for the hippies by the more sedate tourists."

1973, Nov. 24-25: The Gallup Independent of November 21, published a map showing the location of the Sha' lak'o houses, and in the issue of the 26th stated that 10,000 people had attended the ceremony. Tony Hillerman's (1973) novel, Dance Hall of the Dead, is centered around the Sha'lak'o ceremony. It begins with one of the best attention-grabbing sentences of any Southwestern novel, "Shulawitsi, the Little Fire God, member of the Council of the Gods and Deputy to the Sun, had taped his track shoes to his feet." The night of the 1973 ceremony Zuni Tribal Police examined all entering cars for liquor and confiscated all they found. Navajo men entering the Saya:dasha house were not told by the Navajos already present to remove their hats. It was a game to watch what happened as the Salamobia boiled out of the dance room, striking out at all concerned who were wearing hats and not showing respect for the ceremony. Two Mexicans were ejected from the house. At dawn, Saya:dasha untied the last knot in his cord (Lyon 1973).

1975, Dec. 6-7: The YWCA of Albuquerque continued to schedule a tour bus for the Sha'lak'o ceremony. During the final ceremonies of planting prayer sticks, two Sha'lak'o collided and one fell—within seconds Indians and visitors had disappeared. The two Salamobia whipped anyone they could reach. Later in the week all six Salamobia appeared and the Sha'lak'o impersonators and their guardians were whipped. Throughout the next year the Zunis were attentive and thorough-going in the practice of their ceremonies (Lyon 1975). Except for a wagish editorial comment in the Los Alamos Monitor of December 21, 1975, the newspapers of New Mexico did not report the incident.

1976, Nov. 27-28: Andrew Napetcha (1976), Zuni Tribal Historian, issued a paper describing the ceremony and a map locating the Sha'lak'o houses.
Figure 9. Sha'lak'o schematic floor plan, Nov. 24, 1973, Saul Yselu, owner: K, kitchen; P, porch; Dance Area in ceremonial room dug out to provide 10 feet of head room; B, benches; A, altar; C, singers and pottery drum; S, Sha'lak'o rest area; O, hoe for prayer sticks; G, invited guests; DW, dance watchers looking through windows or large holes in walls where windows will eventually be placed.
1980, Dec. 6-7: The Gallup Independent of December 3: "In an attempt to correct what Pueblo officials say are inaccurate explanations published by authors, the Pueblo has issued a pamphlet explaining the ceremony ..." The Independent published a detailed map showing the location of the Sha'łak'o houses and listed a series of rules of behavior to be followed.

1982, Nov. 27-28: The Gallup Independent of November 24, carried a long story about the ceremony. The tribal office issued a map with the location of the Sha'łak'o houses and listing the names of the owners. Alex Seowtewa, Zuni artist, is still working, after 10 years, on the mural paintings in the restored Mission church—the paintings include the life-sized figures of all the Sha'łak'o kachinas (Lyon 1977).

SUMMARY

The schedule of the public portion of the Sha'łak'o ceremonial events and the events themselves have not appreciably changed in the last 100 years. The ceremonial houses are now illuminated with electricity instead of by firelight and oil lamps. In the late 1800s there were a few hundred watchers, but in the late 1900s, the ceremonies may attract over 5000 watchers. The main differences noted are economic: (1) The ceremony is most often held on weekends in deference to a wage economy; (2) The costs for a family to build a new ceremonial house (Fig. 9) and to host the ceremony has gone from a few dollars to thousands of dollars; (3) The financial burden for the entire tribe to monitor and to provide a feast for the thousands of visitors is very great. Finally, the organization and administration of the ceremony was a function of the religious leaders 100 years ago.

Today, this function is probably shared, in part, with the elected tribal officials.

Los Alamos, New Mexico

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When A. V. Kidder convened the first Pecos Conference in 1927, he drew on his personal network of close friends and colleagues interested in Southwestern archaeology. There was no institutional base which he could have used at that time. The historical record, incomplete as it is, shows that Kidder had ties with nearly every member of the conference, represented by past interaction in professional work. Other members had a few ties with conference members but none approached the number of Kidder's. This broad and strong personal network was significant in assuring both the success and the continuity of the conference, although the conference passed temporarily from his orbit in the 1930s and permanently in 1958. Other specialized regional conferences should be studied to identify their origins, whether personal or institutional.

It is both appropriate and pleasurable to write about the Pecos Conference in a volume honoring Albert L. Schroeder, because it was he who first proposed that I undertake the writing of the conference's history. He has been indefatigable in his assistance, by searching out valuable information from many sources, a reflection of his encyclopedic knowledge of Southwestern archaeology and its history.

The Pecos Conference was one of the first, probably the very first, continuing regional specialized conference in the United States. It was begun in 1927 by A. V. Kidder of the R. S. Peabody Foundation, Phillips Academy, Andover, Massachusetts. Kidder had received his Ph.D. from Harvard in 1914, the first in the United States for which a dissertation on Southwestern archaeology was submitted, and in 1915 he had been selected to carry out a long-term, large-scale excavation program for Phillips Academy. He chose Pecos, New Mexico, for this research. From surface evidence—potsherds, the implications of which he was a pioneer in exploiting—he was sure it had a long prehistoric occupation, and he knew its well documented history as a mission center and the major pueblo on the eastern edge of the settled Southwest, surviving into the 19th century.

By 1927 Kidder had completed most of his work at Pecos and had published his landmark volume, An Introduction to the Study of Southwestern Archaeology, with a Preliminary Account of the Excavations at Pecos (1924). Just when he decided that a conference of Southwestern archaeologists would be worth holding is uncertain, but on January 28, 1927, he wrote to Clark Wissler, who had for the past 20 years been in charge of anthropology at the American Museum of Natural History. Kidder's letter began:

I have been talking over Southwestern matters this autumn and winter with Morris and Judd and Roberts, and we all feel strongly that our work would be advanced if all Southwesternists could arrive at an understanding in regard to the underlying problems, the methods of accumulating and presenting data, and (last, but in some ways most important) a standardized nomenclature for artifacts, decorative motifs, and periods of culture. ...I believe that we could get together [this summer] the majority of active workers in this field.... Do you think there is any possibility of

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your being able to come?

[Wissler Papers, Ball State University, Muncie, Indiana.]

At the end of March he wrote Earl Morris that the conference would be held at the Pecos field camp on August 29th, lasting two or three days. And in early July he wrote to A. E. Douglass to thank him for some tree-ring dates from Pecos and added that there would be a conference at Pecos and he was invited to attend. These are the only invitations that have come to light; they all express the same purposes, and others were probably in similar vein.

Since in 1927 there was no national or Southwestern archaeological organization or society, no museum or university department, that could sponsor such a meeting, Kidder simply wrote invitations personally to some 35 people who he felt would be interested. These were mostly colleagues and personal friends (as in the above three examples), a circle that included most, perhaps virtually all, the Southwestern archaeologists active at the time. As far as records indicate, nearly all of them came. And of course, the conference was a great success, adopting what is still known as the Pecos Classification, the first comprehensive framework for the chronology of Southwestern prehistory, with clearly defined criteria for its time units. Other topics mentioned by Kidder in his letter to Wissler were discussed at length, but less conclusively (Kidder 1927).

The concept of the "network" seems the most appropriate one to identify the means by which Kidder created the Pecos Conference, and the usefulness and strength of his network is attested to by the number and professional standing of the participants. Rather than offer my own definition of network, I can refer to a comment by J. A. Barnes, quoted by Clyde Mitchell (1974: 279): "Because the concept has recently become fashionable, the terminological confusion has greatly increased. The terminological jungle, in which any newcomer may plant a tree, is evidence for the basic simplicity of the idea of a network." Mitchell himself added (1974: 280) that "...the idea of a social network emphasizes that the social links of individuals in any given society ramify through that society.... [In using the concept one] seeks to specify how this ramification influences the behavior of the people involved in the network." A personal network, as distinct from a social network, can be seen, then, as a single individual's personal links extending to a number of people, on both a personal and professional basis, who otherwise are not members of a single well-defined group or organization. In the case of Kidder's network, it will be seen below that he greatly influenced their behavior, in their participation in the Pecos Conference and subsequently in their use of its ideas in their archaeological research.

Many of the links among members of the conference, including those that tied them into Kidder's own network, can be identified from letters, biographies, obituaries, reports on field work, etc. Whereas most of the referees knew of the other members of the group, Kidder knew and had interacted with virtually all of them (the small number of exceptions, or "accidental" participants, will be mentioned later).

From the data available, a rather uneven assortment of historical sources, we can sketch briefly the nature of Kidder's relationships, personal and professional, that established the network from which most of the 1927 conference members came, with these examples:

Charles Amsden: at the age of 15 hired as a camp helper by Kidder for his 1914 work in northeastern Ari-
zona; in 1927 on the Pecos expedition staff.

Kenneth Chapman: Kidder first visited Pecos in 1915 under his guidance.

Harriet and Burton Cosgrove: as avocational archaeologists they had been Kidder's guests at Pecos in 1920, to learn archaeological field techniques from him; from 1924 to 1927 he advised them on their excavations at the Swartz Ruin, near Silver City, New Mexico.

Byron Cummings: Kidder worked for him on his field trip of 1908 in southeastern Utah.

A. E. Douglass: Kidder had provided wood and charcoal samples for the development of his tree-ring chronology, and had received dates for the Pecos Mission in return.

Edgar L. Hewett: Kidder made his first visit to the Southwests in 1907 as a student field worker for Hewett. Both served on the American Anthropological Association's antiquities committee.

Walter Hough: Kidder served with him on the above-mentioned committee.

Neil M. Judd: a fellow student in 1908 on Cummings' field trip; in 1920 Kidder was a member of the group that recommended Pueblo Bonito for the National Geographic Society-Smithsonian program that Judd was to direct.

Paul S. Martin: on the staff of the Carnegie Institution Program in Yucatan, to which Kidder was an advisor.

Earl H. Morris: also a participant in the 1920 survey that recommended Pueblo Bonito; on the staff of the Carnegie Yucatan program; Carnegie support for Morris' continuing Southwestern archaeological work was arranged by Kidder; from 1917 onward Kidder and Morris collaborated in several field trips.

Jessie L. Nusbaum: fellow students in the field in 1908; Nusbaum worked for Kidder at Pecos in 1915.

Frank H. H. Roberts, Jr.: because Kidder was so favorably impressed with Roberts' study of the pottery of the Piedra region of southwest Colorado, he recommended Roberts to Judd for the staff at Pueblo Bonito.

Sylvanus G. Morley: fellow students in 1907 under Hewett's direction; from then onward lifelong friends; Kidder was advisor to Morley's Chichen Itza work in 1927 and had already agreed to become director of Carnegie's entire archaeological program.

Oliver and Edith Ricketson: on the Carnegie staff at Chichen Itza.

Harry L. Shapiro: assistant curator at the American Museum of Natural History, Kidder asked Wissler for his participation at the conference to assist on matters related to physical anthropology.

H. J. Spinden: he and Kidder were fellow graduate students at Harvard in 1909.

Joseph B. Thoburn: Kidder, as chairman of the Committee on State Archaeological Surveys of the National Research Council, had corresponded with him about Oklahoma archaeology; Thoburn had visited Andover on a tour of eastern museums in 1917.

Without continuing these examples, their implications can be stated simply: Kidder had identifiable previous contacts with at least 24 of those at the conference, well ahead of Judd with 10, Hewett with 8, and Morris with 6. Crude as this measure may be, it at least suggests the breadth and strength of Kidder's ties, and the reason that he was in such an effective position to convene and preside at a successful conference.

Many similar contacts, both professional and personal, have been identified in our fragmentary records, for most of the other 1927 conference members, of which the following are a few examples:

Judd was Cummings' nephew, and
Judd was drawn to archaeology through volunteering for his field trips of 1907, 1908, and 1909.

Nusbaum worked for Hewett on the staff of the Museum of New Mexico, beginning in 1909.

Judd and Odd S. Halseth worked together on the aerial survey of Hohokam canals in the 1920s.

Halseth worked for Hewett in 1927.

At least six others besides Kidder were actively collecting tree-ring samples for A. E. Douglass.

Chapman and Harry Mera worked together from 1923 onward in developing the Indian Arts Fund in Santa Fe.

Lansing Bloom and Chapman worked with the Cosgroves in their 1922 Mimbres survey.

A few of those in the 1927 conference seem to have ties with only one or two others there, or at least further ties have not turned up in available records. For example, T. T. Waterman was a visiting professor at the University of Arizona at the time and came to Pecos with Dean Cummings, although he had no previous Southwestern interests. Erna Gunther and Leslie Spier and their two small sons stopped off en route from Seattle to Norman, Oklahoma, where Spier would be a visiting professor; Spier had, of course, made a major contribution many years earlier with his Zuni survey, but subsequently had turned to ethnology. J. A. B. Scherer was director of the Southwest Museum, Los Angeles, on whose staff was Charles Amsden, but had no previous Southwestern archaeological interests.

There are even a few for whom no contacts with other conferees have been discovered (but given the spotty nature of the record, negative evidence is not worth much). For example, T. F. McLwraith of the University of Toronto had interests in Canadian archaeology and Northwest Coast ethnology; yet J. O. Brew has commented (letter of August 12, 1981) that "McIwraith was an inveterate conference goer, who loved conversation and was good company." Charlotte Gower was a graduate student at the University of Chicago about to go abroad for a study of a Sicilian village, but may have known Paul Martin (who was invited by Kidder) as a fellow graduate student, and through him learned of the conference. But with only a few exceptions, the conference was made up of people linked by professional ties, and the largest number of ties were to A. V. Kidder.

It should be noted that Neil Judd, who ranked second but far below Kidder in number of links, was an active and highly regarded Southwestern archaeologist, the contemporary and close friend of Kidder (both were in their 40s) and that Hewett, who ranked just below Judd, was the leading organizer and administrator of Southwestern archaeological and educational activities (he was then in his 60s). Hewett had his own extensive and powerful academic and political network in New Mexico (see Bloom 1939). He is the only person at the conference who can be identified as threatened by Kidder's emerging leadership; oral tradition in Santa Fe has it that Hewett walked out of the 1927 conference, saying that the proposed classification would not work and would not be accepted by other archaeologists. This tradition has a good chance of being correct, in the light of the comment by Jesse Nusbaum, who knew Hewett well: "Ideas other than his own were an anathema to Hewett and he opposed them.... As he grew older he became more fearful of change and improvement. He fought the ideas of younger men" (Nusbaum 1980: 21). Also, it is significant that the 1927 conference came when it did in Hewett's career. Stocking (1982: 5) has written that "...Hewett wielded tremendous regional influence in the
early 1920s. Toward the middle of the decade, his power had begun to wane." So it is hardly surprising that he is the only member of the 1927 conference with whom Kidder's close relationship of earlier years seems to have weakened and turned to rivalry rather than close cooperation.

Kidder was, at this time, the leading innovator in Southwestern archaeology, creating the "new archaeology" of the 1920s and causing as much debate among believers and doubters as occurred with the "new archaeology" of the 1960s. But Kidder was an archaeological organizer also, and was part of another network far removed from Southwestern archaeology. It was this other network that was responsible for a planned effort to secure control of the funds that John D. Rockefeller, Jr., was considering giving for the creation of an anthropological research center in Santa Fe. By bad luck, because of his heavy travel schedule, Hewett, the leader of archaeological activity in Santa Fe at this time, was out of town when Rockefeller made his Southwestern visits. It was Nusbaum and Chapman, both members of Kidder's network, who advised and encouraged Rockefeller. In July 1927 a group met in New York City to make plans as how best to present their plans to Rockefeller before Hewett secured his support. They promptly incorporated in New Mexico to be ready to formally receive funds, persuaded Rockefeller to accept their plan, and left Hewett hopelessly by-passed in his own efforts to control the funds (see Stocking 1982; Toulouse 1981). This organizing group, which succeeded in creating what became the Laboratory of Anthropology, included six members of Kidder's personal network, most of them Pecos Conference participants. Others in the group, comprising almost a full roster of the elite national anthropological establishment, included Franz Boas, Isaiah Bowman, Fay-Cooper Cole, H. C. Bumpus, Roland B. Dixon, Pliny E. Goddard, Carl E. Guthe, Chauncey H. Hamlin, Frederick W. Hodge, Arthur Lithgoe, R. V. D. Magoffin, Marshall Saville, Frank Speck, and Clark Wissler. Here is another network, overlapping Kidder's, but also including many of the most prestigious leaders of the profession, a network into which Kidder had obviously been accepted. Another clue to the closeness of interaction among many of the 1927 Pecos Conference participants can be found in the newsletter Teocentli. It consisted of a twice yearly collection of informal reports from individuals invited to respond by Teocentli's founder, Carl Guthe, who had worked with Kidder at Pecos from 1916 through 1921. Of the newsletter's 31 most frequent contributors in 1926 and 1927, 16 were conference invitees. The extent to which Kidder's network, as represented by the conference members, included recognized professional leaders, is also suggested by the fact that of the 105 members of the American Anthropological Association's Council, which consisted of virtually all the professional anthropologists in the United States at the time, 15 were at the Pecos Conference. Kidder's position and his personal and professional ties served him well in drawing together a strong group for his conference, thus assuring that results would be well regarded and widely known.

Although Kidder seems to have made no suggestion in 1927 for an annual or biennial continuation of the conference, he used much the same network to convene a second Pecos Conference in 1929. This time 23 of the 1927 participants were present, as well as younger archaeologists emerging as the new generation of professionals (such as Katherine Bartlett of the University of Denver, Lyndon Hargrave of the Museum of Northern Arizona, and Wesley Bradfield of the Museum of New Mexico). Partly because
this was also the formal dedication of the Laboratory of Anthropology, Santa Fe, there was also a broader range of non-archaeologists; for example, Daryll Forde, Frank Dobie, Irving Hallowell, Paul Kirchhoff, Gladys Reichard, and Carl Wissler. There were also a dozen students holding fellowships at the new Laboratory of Anthropology, which, not entirely by chance, was directed by Nusbaum, had Mera running its archaeological survey, and Kidder as chairman of its board, Kidder's network functioning well in this new venture.

A distinctive feature of the Pecos Conference is that it has never had officers, by-laws, dues, a headquarters, or memberships. For many years the major part of the conference was informal, consisting of volunteered reports on their recent field work by those present. And each year someone offered to host the next conference at a field headquarters, museum or campus, and an ad hoc committee was formed to send out announcements, make local arrangements, and do as much or as little program planning as it wished. But after the 1931 conference, held in conjunction with the dedication of the Laboratory of Anthropology buildings, and planned in considerable detail by Nusbaum and Kidder, no further conferences took place for several years. By this time Kidder was fully occupied with directing Carnegie's Mesoamerican archaeological research. In Kidder's absence, no one undertook to convene a conference until 1937, when the Chaco Canyon Field School, which owed its origin to the energy and organizing skills of Hewett, began to hold an annual Chaco Anthropological Conference. This clearly represented a shift from Kidder's network to Hewett's, and it was not until 1946, when no Chaco conferences had been held because of World War II, that Kidder's influence reasserted itself. Two of his close friends and professional colleagues of the next generation, Emil W. Haury and Erik K. Reed, convened a conference in Santa Fe, planned as a small meeting, by invitation only. The initial letter of invitation went to Gordon Baldwin, J. O. Brew, H. S. Colton, Eric Douglas, Malcolm Farmer, Hulda Hobbs, J. Charles Kelley, Dale King, Donald Lehmer, Paul Martin, Harry Mera, Earl Morris, Jesse Nusbaum, John Rinaldo, Malcolm Rodgers, Sidney Stallings, Charlie Steen, Stanley Stubbs, Walter Taylor, Marjorie Tichy [Lambert], and Arthur Woodward. There were many new names, but not many with their primary ties to the School of American Research, the Museum of New Mexico, and the University of New Mexico, the major bases from which Hewett operated. Most of the individuals had close ties with Kidder (some through Harvard's Peabody Museum) or with the National Park Service (Reed providing a link between the Park Service and Harvard).

However, in 1947 the conference at Chaco was held again, the pendulum taking one last swing in that direction. In 1948 the conference was at Haury's Point of Pines Field School; in 1949 back to Santa Fe; in 1950 to Colton's Museum of Northern Arizona; in 1951 again at Point of Pines; in 1952 to Pecos National Monument for the 25th anniversary; in 1953 to Flagstaff again; in 1954 to the Southwestern Archaeological Center of the National Park Service, at Globe, Arizona; and in 1955, 1956, and 1957 again to Santa Fe, Flagstaff, and Globe. All of this seems to have been a continuation of Kidder's influence, under the leadership of members of his own personal network such as Haury, Colton, and Reed.

But the year 1958 saw a clean break, with the Pecos Conference going to the campus of the University of New Mexico, where Hewett had founded the Department of Anthropology in 1929 and became its first
professor. We can see in this event in 1958 both a decline in Kidder's dominance in Southwestern archaeology and in the inevitable shift of the pendulum towards centers of archaeology that did not exist in 1927 but were now growing to importance. Conferences in 1959 and 1963 at Fort Burgwin, in 1964 at Window Rock, and in 1965 at Trinidad, Colorado, also suggest the diversity of centers where new leadership in Southwestern archaeology was growing. It would be an exaggeration to say that Kidder's personal network maintained the strength and influence into the 1950s that it had had in the 1920s. However, he visited the Southwest most summers, after the winter's work in Mesoamerica, kept up a keen interest in the research going on, and in 1958 published his final report on Pecos, a major volume that was one of the outstanding contributions of his career.

But gradually the conference format that Kidder had started with—an absence of prepared papers, an emphasis on reporting each person's field work—was successfully challenged, with carefully planned symposia, major topics for the conference to focus on, and the condensation of individual field reports into summaries. However, Kidder's influence declined slowly. For example, after having several names in its early years, changing as it changed locations, the conference name was officially returned to "The Pecos Conference" in 1949, to honor its founder and the scene of its first meeting. In 1963 Odd Halseth delivered a eulogy of Kidder, who had died only a few weeks before that summer's conference, and stated that the first Pecos Conference "laid the foundation for a tradition in Southwestern archaeology which Kidder himself referred to as the 'Pecos Clan Spirit,' and many of us have benefited from the friendships that were cemented on that occasion" (Halseth 1963). It is doubtful that the Pecos Conference would have been founded, or if founded would have survived, under any leadership except that of A. V. Kidder, who was held in such personal and professional esteem that his influence in Southwestern archaeology continued up to his death.

Other small, specialized conferences have developed since 1927, such as the Plains Conference in 1931, the Southeastern Conference in 1937, the Iroquois Conference in 1945, the Caddo Conference in 1946, the Great Basin Conference in 1954 (founded at the Pecos Conference held that year in Globe), the Gran Quivira Conference in 1972, and the Mogollon Conference in 1979. The extent to which each was the work of a single individual drawing on his personal network of colleagues (as with Jennings and the Great Basin Conference and Speck and the Iroquois Conference), can only be judged after considerable further research. I hope others are undertaking this, as the best informants on the unwritten history of anthropology will not be with us always. Most if not all of these conferences began outside the formal structure of anthropological institutions and organizations. Perhaps museums and departments do not have the creativity, vision, flexibility, and initiative of individuals or small groups of colleagues—networks. Each of these conferences deserves to have its history studied, as each is an important segment in the growth of our profession and particularly of its communication systems. It will be interesting to see to what extent they were the lengthened shadow of a single vigorous individual or small group, drawing on the strength of personal networks which were based on both friendship and professional cooperation. I suspect that in each case individual or group initiatives came first and only later an organizational structure came into existence to facilitate the holding of the conference. Since the history of
anthropology is still in the early stages of being written, it is not inappropriate to close with these speculations and the hope that firmer conclusions will emerge as research on small conferences advances.

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Southwestern Culture History

Twenty-one contributors to this collection honoring noted Southwestern archeologist and historian Albert H. Schroeder cover a broad range of subjects in the prehistory and history of Texas, New Mexico, Arizona, and northern Mexico. Mogollon pottery, Chupadero jugs, Anasazi houses, and water systems and reservoirs are examined from the prehistoric period. Arizona topics include Yuman ceramics in the northwest and early Piman agriculture in the south of the state. Two sites identified by Coronado—Chichilticale (either the lower Salt River in Arizona or the upper Gila River in New Mexico) and Cibola (is it Hawikuh at Zuni?)—are reconsidered. Spanish colonial policy regarding the Pueblo Indians and North Mexican “peace establishments” or reserves for Apaches suggest new aspects of frontier history. Still other contributors look at Indian ceremonials, footwear on New Mexico’s Hispanic frontier, turquoise mining in the Cerrillos district, and wells in the patio of the Palace of the Governors, Santa Fe.