

# TWO PREHISTORIC SOLSTICE OBSERVATORIES IN THE SACRAMENTO MOUNTAINS, SOUTHERN NEW MEXICO

By  
Peter L. Eidenbach



Environmental Quality Services

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IN THE SACRAMENTO MOUNTAINS,  
SOUTHERN NEW MEXICO**

*By*  
**Peter L. Eidenbach**  
*with contributions by*  
**Cye Gossett**

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**the Bureau of Indian Affairs,  
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*Submitted by*  
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**1981**

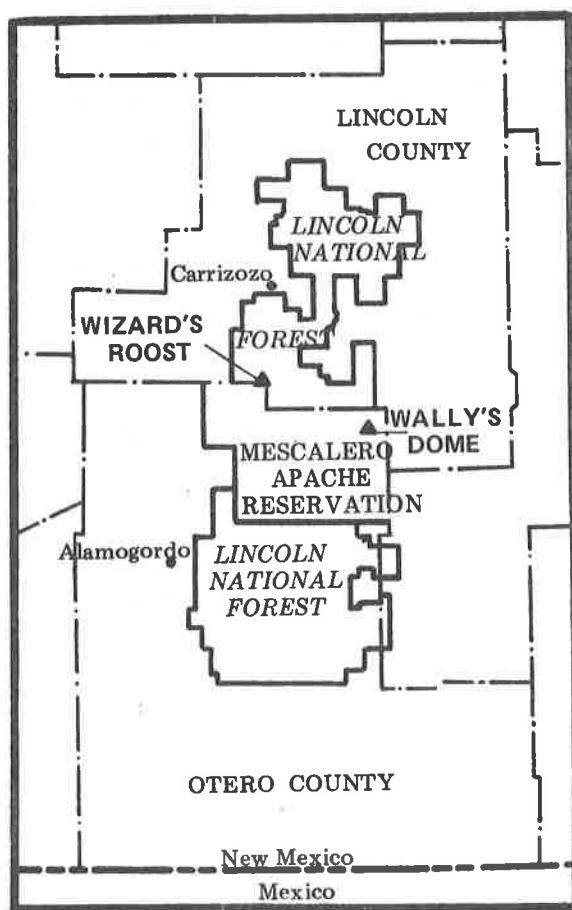


*Photo 1: Winter solstice sunset at Wizard's Roost, December 1977, confirmed our expectations. The setting sun descended toward Sierra Blanca Peak, traversed the north ridge, and finally disappeared behind the ridge point.*

## ABSTRACT

In 1977, Human Systems Research located the first of two prehistoric solstice observatories in the Sacramento Mountains of south central New Mexico during contract survey for the Bureau of Indian Affairs within Lincoln National Forest. A second site was found within the Mescalero Apache Reservation during subsequent research by HSR and the BIA Timber Survey.

These two sites are both constructed from dry-laid stone masonry and include a variety of features, at least some of which indicate solar and stellar alignments. Both are isolated and located in unusual physiographic positions, unassociated with domestic structures. No similar structures are known in this portion of the Southwest, although similar features have been reported from village sites. These two sites may be 1,500 to 2,000 years old and may be affiliated with the Late Archaic-Early Mogollon transition in southern New Mexico. This period marks the shift from hunting and gathering (with limited horticulture) to fully sedentary agricultural village life. These two sites appear to represent simple yet accurate means of monitoring seasonal change, a factor which becomes of increasing importance for successful agriculture as one proceeds north, and frost-free periods become shorter and more variable. These sites, then, may document a critical and as yet poorly recognized aspect of agricultural technology in the prehistoric Southwest.



SOUTH CENTRAL NEW MEXICO

Figure 1

## ACKNOWLEDGEMENTS

The recognition and interpretation of the two prehistoric solar observatories reported here is the direct result of contract archaeological research funded by the Bureau of Indian Affairs, Albuquerque District Office, acting on behalf of the Mescalero Apache Tribe. Particular thanks are due Mr. Bill Allan and Mr. John Broster of that office, whose encouragement and expertise prompted us to continue our investigations beyond the scope of the original clearance project. Additional assistance was furnished by Mr. Stanley Stroup and Ms. Pat Spoerl, Lincoln National Forest.

Dr. Jack Evans, Sacramento Peak Solar Observatory (retired), helped us unravel the mathematics and geometry of Wizard's Roost. Dr. Charles Hyder, independent physicist and astronomer, visited the site on numerous occasions, and conducted the Sirius observations which have proved crucial in guessing possible dates for Wizard's Roost.

Special thanks are also due to the friends, colleagues and staff of Human Systems Research who have assisted in site mapping and photographing the solstice events themselves: Ernest Shearin, Gail Wimberly, Don Woodman, Walter MacDonald, Terry Clennon, John Beardsley, Lee Chavez, Michael Bober, Bill and Cy Gosssett and Greg Cleveland.

My family also deserves special thanks. My wife, Sara, participated during solstice observations on several occasions and has been a continual source of encouragement and understanding. My daughters, Samantha and Kirstin, have graciously accepted my absences or accompanied me during these two crucial times of the year, just before Christmas and on Kirstin's birthday, June 20th.

Finally, I would like to thank Mark Wimberly, my close friend and partner, whose curiosity, knowledge and healthy skepticism were essential throughout these investigations. In July 1980, Mark sustained fatal injuries in a helicopter crash above Wizard's Roost, while attempting to photograph the site from the air. His participation is sorely missed.

Composed and Typeset by  
Gail Wimberly  
Composing Services  
Tularosa, N.M.

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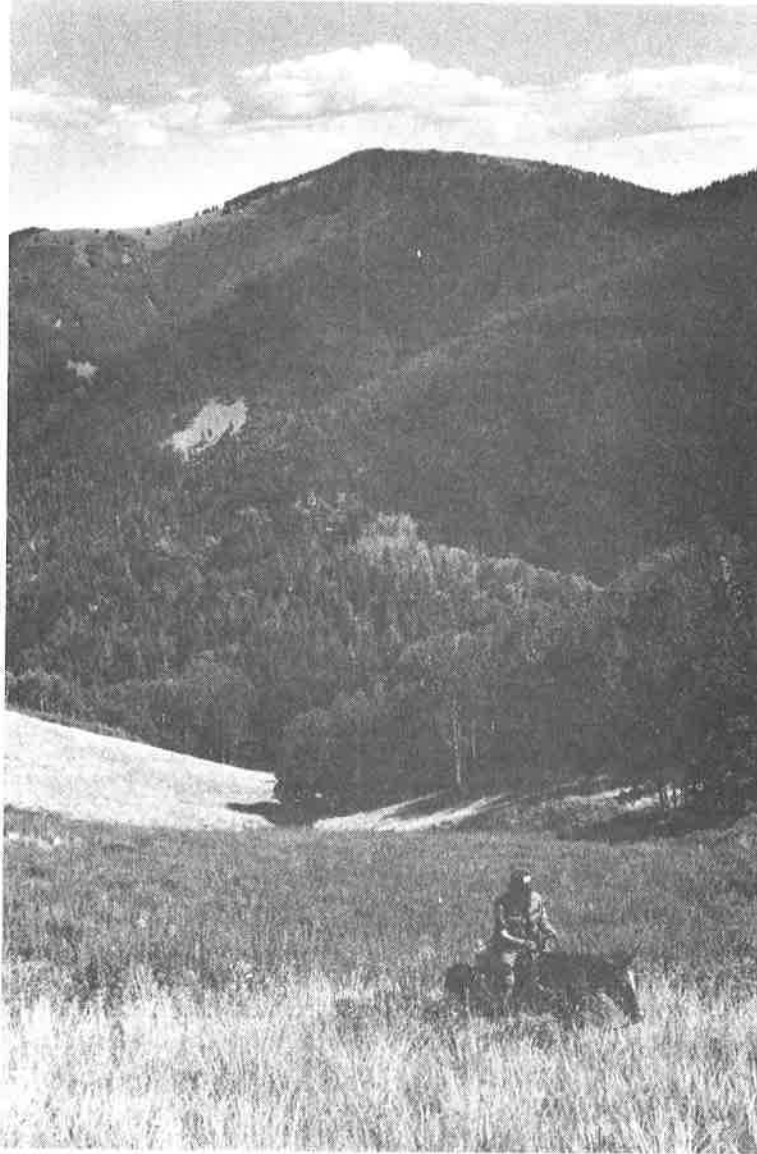
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*Photo 2: Survey on horseback proved highly effective at the high elevations encountered during the 1977 HSR inventory of sites near Sierra Blanca Peak (in background; elevation 12,003 feet).*



## TWO PREHISTORIC SOLSTICE OBSERVATORIES IN THE SACRAMENTO MOUNTAINS, SOUTHERN NEW MEXICO

### INTRODUCTION

During September 1977, Human Systems Research surveyed three and one half square miles of high altitude mountain terrain in the Sacramento Mountains near Sierra Blanca, the highest peak in the region. Elevations in the survey area ranged from 8,500 to more than 11,000 feet along the crest and upper east slope of the mountains, where Canadian zone tundra alternates with Sub-Alpine coniferous forest. The purpose of the survey was the location of cultural resources, primarily archaeological sites, which might be adversely affected by the potential expansion of the Sierra Blanca ski area, operated by the Mescalero Apache Tribe.

Even today, little is known about prehistoric human adaptation at these extreme elevations, and little in the way of surface archaeological materials was expected. That expectation was borne out until almost the last day of survey. While a number of modern, or at least recent, hearths and small camps attested to recreational forest use by both backpackers and mounted parties, no archaeological sites were discovered. Up to this point, the project had remained quite simple and straightforward, much like many other small clearance projects conducted to assess the potential impact of new land modifying activities proposed on federal lands.

Survey had been completed except for one long, narrow ridge which marked the highest point of the improved road to the ski area. The improved road turned and began its descent to the ski bowl just below the ridge point, where a microwave transmission access road branched off and proceeded along the ridgeside toward the north. The proximity of these modern features suggested that any sites in this vicinity would have been noted long before our survey, if any existed.



*Photo 3: The Wizard's Roost site, situated on this ridge peak above 10,000 feet, proved to be undisturbed, despite its proximity to the unimproved forest road which skirts the ridgeside below.*

Our survey team worked slowly down that ridge, and had reached a small, isolated grove of weathered trees which screened the ridge point itself. We rounded these trees, and a small field of broken granite boulders, deposited by glacial activity thousands of years ago, lay before us. Evidence of human activity was unmistakable. Three conical rock cairns and a small, circular rock room had been constructed from the granite rubble of the boulder field. At that moment, a simple clearance project had become transformed into an archaeological puzzle which continued to claim our attention long after our report had been submitted to the Bureau of Indian Affairs (Wimberly and Eidenbach 1977).



*Photo 4: Room 1 and the main cairn were the most obvious features at Wizard's Roost, although two other indistinct rooms and two additional, smaller cairns were also evident.*

We spent the remainder of that day, most of the next, and have returned numerous times during the past 3+ years exploring the vicinity of these enigmatic features in search of an answer to the questions posed by this encounter. We had come across the rarest of birds in archaeological clearance survey work, a site type unrecorded and unknown in the regional archaeological record.

As we examined the site closely, the puzzle began to complexify. A search for artifacts yielded nothing more than a few modern tin cans. We discovered a recent U.S.G.S. elevation brasscap at the edge of the site, and provisionally concluded that the cans we had found down-slope at the margins of the rock field represented nothing more than the surveyors' lunch. The rock features could not be so easily explained. Surface weathering of the stone and extensive lichen growth, which often bridged the dry-laid joints of the rock features, indicated two things. First, the site itself could not possibly be as recent as the nameless surveyors' visit and lunch, and second, the site had remained almost completely undisturbed. Still, a reasonable explanation for the rock features continued to elude us. No direct evidence of antiquity existed.

Visions of glandular teenagers burning off excess energy at an altitude above 10,000 feet alternated with equally wild professional conjecture. An eagle trap? A small fort? An obscure monument erected in memory of some nameless event, or person, or idea?

Among the last of our wildest speculations later that first night was the possibility that the site might truly be prehistoric, and in fact might have been a prehistoric observatory calendric site. John Eddy had recently published his analysis of Big Horn Medicine Wheel (1974), which appeared to qualify. General professional opinion was still skeptical, however, and many still maintained that calendrics and astronomy were limited to the complex state societies of Central Mexico and South America. Yet, this conjecture possessed one virtue not shared by any of the others we could suggest — it at least seemed to be testable.

We consulted the local experts. Jack Evans, retired director of Sunspot Solar Observatory and an old friend, helped us work out the complex geometry of our first hypothesis: if the site, which by then we had dubbed *Wizard's Roost*, was an observatory, then the alignments of its structural features should indicate major celestial objects — the sun, the moon, the brightest stars, the planets or even comets or novae. We compared our site map with the corrected azimuths supplied by Evans and the results were disappointing. Nonetheless, we resolved to revisit the site, check our map and see if any additional features at a distance from the structures we had already noted could be discovered (and one was! See page 11).

That visit was a revelation, and immediately pinpointed a key assumption. Eddy's work at Big Horn (a National Register site) and other sites along the edge of the plains relied on the identification of paired features within a site; a *backsight* (by analogy with rifle sights) marking the location of the observer, and a *foresight* at a distance along, or at least bisecting the horizon. We had ignored the most obvious distinction between Eddy's plains sites and *Wizard's Roost*, within the spine of the Sacramento Mountains. A quick check of the azimuths supplied by Evans revealed that, in contrast to sites on the plains, *Wizard's Roost* was situated to take advantage of the local topography, so that prominent peaks would serve as the observation foresights.



*Photo 5: After the Wizard's Roost solstice alignments provided an initial confirmation of our observatory hypothesis, other potential alignments with the topography were surveyed and recorded, in hopes that some might indicate rising points of bright stars.*

Still, this model could only be confirmed by the Solstice observations themselves. We confirmed these conjectures at the first opportunity, Winter Solstice 1977, and on subsequent occasions during both winter and summer solstice (June 21-22 and December 21-22, 1978).

The observational results were both gratifying and, at times, spectacular. Winter rise and set points were closer in alignment than predicted by geometry and magnetic compass.

This first confirmation of our hypothesis forced us to look outward. If the site was, indeed, an observatory, then whose? No artifactual materials could be located anywhere in the site vicinity, and chances of locating any which might have been outside the boulder field itself were low. Most of the open ridgeline supports a dense tundra sod and ground cover is complete, save for active rodent holes. The exposed nature of both the ridge and the site itself, combined with high humidity and rainfall, eliminated the possibility of recovering any datable organic materials.

Charles Hyder had followed our work with great interest and undertook the study of possible stellar alignments, which might be used as measures of the earth's "precession" (see page 12) and hence an estimated construction date. This line of evidence had already been amply documented and tested by Eddy (1977) at a number of *medicine wheel* sites. Hyder's observations at Wizard's Roost were hampered by both the small size and the poorly defined nature of the stone structures. Still, he was able to confirm that one alignment might have indicated the heliacal\* rise of Sirius, the *Dog Star*, although other stars (and consequently other dates) like Rigel, Betelgeuse and Aldebaran would also have been possible. The observed difference between that stone alignment and the present rising point of Sirius was approximately 20 degrees, suggesting a date of approximately 1,500 years ago, if the alignment was truly to Sirius. Hyder speculated that the useful life of a Sirius alignment could have spanned the period from 2,000 to 1,000 years ago, or approximately 100 B.C. to A.D. 900. The solstice alignments, however, would not have been affected by precessional changes and remain within one arc minute today.

Although these dates were guesses, they suggested a period identified in the region's culture history with the Jornada Mogollon. Further, they suggested a date coincidental with the intensification of agriculture and the appearance of a more settled village way of life.

Needless to say, this guess was quite attractive, but still a guess. Such a date might imply a functional explanation in accord with the elaborate calendric systems developed in the more fertile environments of Central Mexico, the Mediterranean, and Asia. Clearly, an accurate knowledge of the seasons is essential for successful agriculture, and at least the most basic seasonal data become more critical as one proceeds north above the frost line, and potential growing seasons become progressively shorter.

Still, we lacked any confirmation that the site was indeed prehistoric. Hyder continued to point out that the key alignment could just as conceivably indicate any of the brighter easterly stars, including Rigel which exhibits a heliacal rise at the present time.

We continued to return to Wizard's Roost at solstices and on other occasions. Although the site itself was small and unimpressive, the scenery was spectacular. The view to the east was unimpeded for more than 30 miles, until the horizon became obscured by dust and by the air itself.

We also continued to speculate, as we gazed out over the western margins of the Llano Estacado, or Staked Plains. One prominent feature continued to draw the eye, marking the

---

\*heliacal: literally, "with the sun"; practically, just before the sunrise.

Wizard's Roost winter solstice rising point. Pajarito Peak, 23 miles distant, formed the solitary break along that smooth and hazy horizon. Why not other observatories with similar apparent rules of construction and placement?



*Photo 6: From the vantage of Wizard's Roost, the winter solstice sun rises along the east slope of Pajarito Peak, almost exactly marking the location of the second site, Wally's Dome, 23 miles away.*

At this point, "luck", or "serendipity" seemed to take a hand, and rendered our idle speculation into yet another hypothesis. "Luck", in this case, was embodied in the person of a local mineral prospector who wandered into the office one day with wild tales of Aztec Gold, his dog-eared copy of Von Däniken under his arm, and three or four indecisive but interesting Polaroids clutched in his hand. The Polaroids were intriguing, but his descriptions were even more suggestive. He described a remote location on the Mescalero Reservation where, he claimed, a rock wall, "picnic tables and chairs" and rock cairns dominated the top of an unusual metamorphic dome. He had not as yet taken a sample of the rock, and was reluctant to locate the area on a map. But he did volunteer to guide us out there while he collected a mineral sample for spectrographic analysis.





*Photo 7: Major features at Wally's Dome included a tall cairn (right foreground) incorporated in the low wall, a large main cairn (right midground), and numerous upright stones (like the paired slabs just right of the tall cairn).*

A week or so later he led us to the site we have dubbed *Wally's Dome*. The anticipation mounted during the three-hour drive as we proceeded east across the Reservation ranch roads. Finally, at his direction, we turned down an almost obliterated dirt track, winding our way slowly through the juniper and oakbrush which had begun to recapture that old road. As we drove beyond the last few trees, our view was dominated by two features — Pajarito Peak, and a bare, metamorphic rock dome which had upthrust and closed the sideslope topography into a hidden valley nestled at the eastern foot of the peak. We spent most of that afternoon mapping the site on the dome, with a compass and steel chain, as rapidly as possible. It was July — by 2:00 that afternoon the thunder heads had built to a threatening wall just west of the valley, and lightning was striking all along the ridges of Pajarito Peak, less than a mile away.

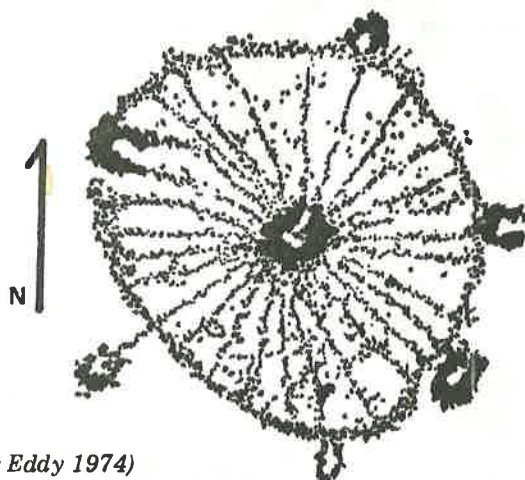
Two facts were immediately apparent. First, site features were oriented to indicate at least two solstice events; summer sunset and winter sunrise. In addition, these structural alignments were not simply *mirror images*, but were discrete, and appeared to compensate for angular elevation of the horizon. Second, in contrast to Wizard's Roost, this site did contain prehistoric artifactual materials. And, most importantly, both observatories, although not mutually visible, were aligned to each other along a solstice bearing. This factor was of key significance, since it offered support for the idea that both sites were related and possibly contemporaneous (Eidenbach 1979).

Subsequent visits to Wally's Dome, with the assistance of John Broster of the BIA, confirmed the alignments and allowed a more thorough study of the artifactual materials on the site. BIA Timber Surveys have since documented other prehistoric campsites in the Wally's

Dome vicinity, and a comparison of the artifactual materials demonstrates that the observatory dates to the same general period. Since these sites contain diagnostic stone tools, particularly projectile points, an additional dating method became available. Although these formal comparisons are based on limited and very general, regional projectile point chronologies, and thus cannot constitute firm proof of exact age, they do compare quite well with estimates obtained by Charles Hyder from stellar observations at Wizard's Roost for the Sirius hypothesis.

These dates point to a period of 1,000 to 1,500 years ago, recognized in the regional archaeology as the transition from the Late Archaic to the Early Mogollon. This period is characterized by the transition from a hunting and gathering way of life with limited horticulture, to increasing reliance on large-scale agriculture and suggests that both observatories represent (at least in part) a technological component of the sedentary agricultural complex attributed to the Jornada Mogollon. The significance of that component is clear even today. The Tularosa Basin and Range climate is quite variable and the frost-free period can be quite short. In the absence of simple calendric information, successful agriculture bears an increased risk. Reliance on large-scale agriculture in the Tularosa region, particularly in the highly productive mountain valleys, is not possible without the ability to predict the frost-free period, allowing sufficient time for crop maturation.

The predictive knowledge represented by these observatories may have been a key factor in the intensification of an agricultural complex which had already existed in the area for more than 3,000 years. This intensification led to rapid increases in the local population and the development of sedentary village life for the first time in the history of the Tularosa Basin.



(after Eddy 1974)

**BIG HORN MEDICINE WHEEL, WYOMING**

Figure 2



**PETROGLYPH – THREE RIVERS, N.M.**

Figure 3

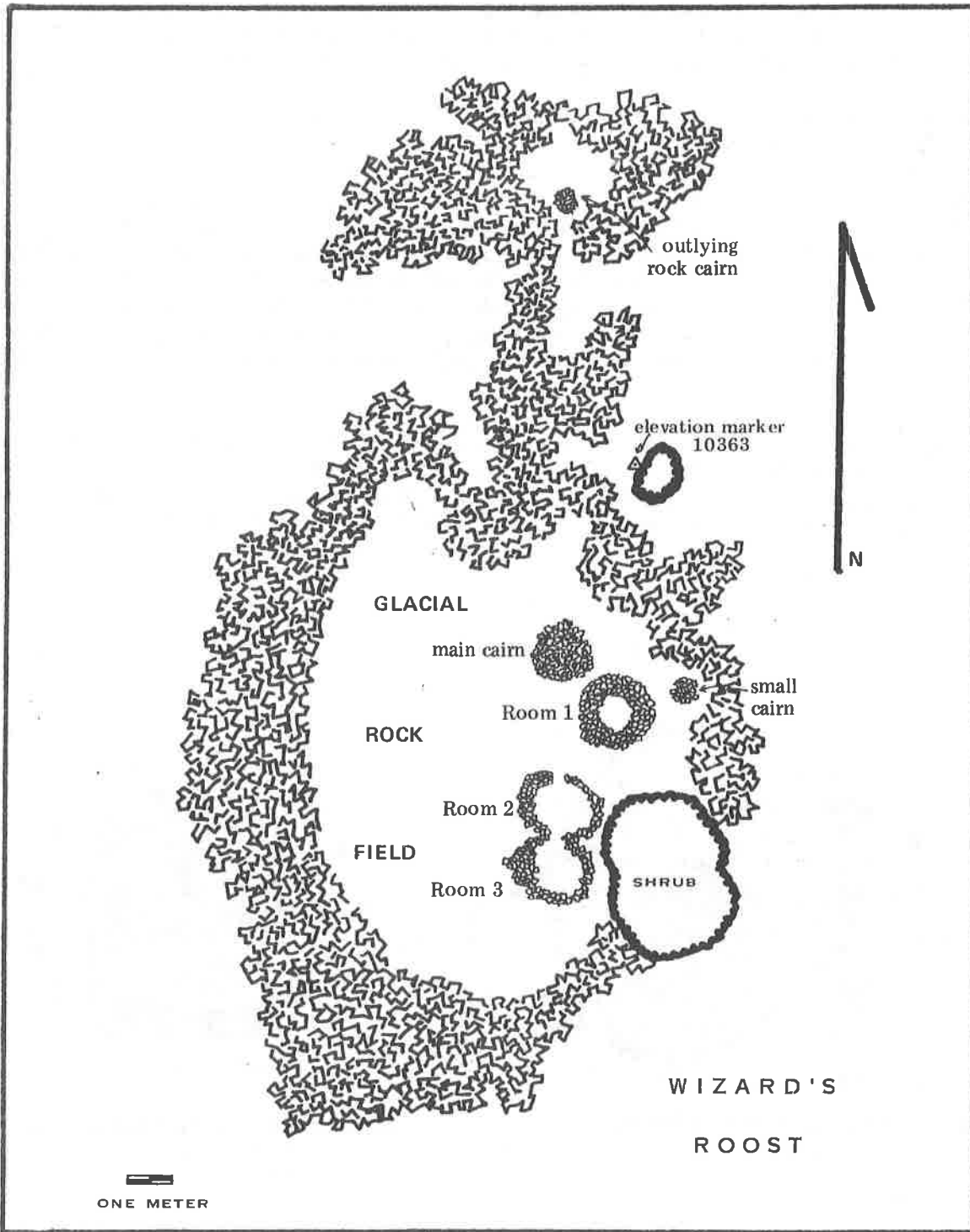


Figure 4



## WIZARD'S ROOST

Lincoln County, New Mexico  
Age: circa 100 B.C. to A.D. 900  
Elevation: 10,363 feet; 3,159 meters

### ENVIRONMENTAL SETTING

Wizard's Roost provides a commanding view of the Eagle Creek and Rio Ruidoso valleys, and Sierra Blanca, the highest peak in the Sacramento Mountains. The eastern to southeastern horizons are unobstructed. The higher elevations of the Sacramento crest (to the north and west) create a nearby, local horizon.

The site occupies a rocky ridge point where sparse tundra grasslands predominate. Occasional stunted evergreens are scattered through these mid and tall grasses. Wild iris, lupine and a variety of forbs occur throughout open areas. Below the ridgetop, evergreens and aspen form a loose canopy above an understory dominated by porter ligusticum ("Chuchupate" or "Osha") and varieties of gooseberries.

The entire site is located within a field of glacial drift consisting of angular rocks (generally brick to concrete block size) with glacially rounded edges. Site features have been cleared and constructed within the field and even the deepest feature (Room 1) does not extend to a soil surface. In fact, the larger and more angular nature of the rocks comprising the floor of Room 1 suggests that the site may be underlain by bedrock.



*Photo 8: Room 1, the central feature at Wizard's Roost, offered a necessary degree of protection from the elements for both modern and prehistoric observers of the winter solstice.*

The location of Wizard's Roost exposes any occupant of the site to the extremes of high altitude weather. Wind speeds are excessive during all seasons, with calm days being rare during any time of the year. Summer thunderstorms engulf the site and nearby ridges in clouds, and subject the surrounding forest and isolated trees on the ridge to frequent lightning damage. The presence of glacial drift and alpine tundra at this timberline position reflect the winter conditions which still persist, in only slightly more moderate form today.

## SITE DESCRIPTION

Wizard's Roost consists of a complex of piled rock features in a glacial stonefield (drift) on a ridge point at an elevation above 10,000 feet. Three generally circular, stacked-rock wall rooms have been constructed (and in one case, excavated) from angular glacial debris. Three stone cairns and a shallow depression are also evident.

Initially, Wizard's Roost was enigmatic. With the exception of five tin cans scattered in the rocks, bits of survey flagging tape on a nearby tree, and a survey stake and brass cap below the tree, cultural material was totally absent from the site. All features of the site are the result of clearing and dry-stacking glacial rock. The two most substantial constructions on the site are the largest cairn and Room 1. These two features are substantial in cross-section. The two meter base of the main cairn and the one meter basal thickness of the walls of Room 1 provide more stability to the dry-stacked construction. Each of these features appears to be largely complete.

A few of the smaller rocks along the east edge of Room 1 have fallen into the room and probably a few others have fallen on the outside of the wall or tumbled down the margins of the cairn. However, extensive lichen growth on the constructions bear witness to their stability:



*Photo 9: A survey transit, located within Room 1 at Wizard's Roost, indicates the exact point of the summer solstice sunrise.*

some colonies have spread across the cracks between rocks. Other features of the site have not fared so well. Both the cairn to the north of the main cairn and the cairn to the northeast of Room 1 appear collapsed to some degree, with displaced rocks lying around the base of each. Rooms 2 and 3 to the south of the main cairn are in only fair condition. Apparently, these rooms were not as substantially constructed as Room 1. Floor clearing was less than in the case of Room 1. The walls, while in one case standing four courses high, were only one course wide and thus have fallen both inside and outside the rooms around their circumference.

An additional small cairn was discovered later, during solstice observations. This cairn occupies the northern ridge side, isolated from the site itself at a distance of about 100 meters. Although the cairn is not visible from any of the major site features, it lies along the north axis described by the main and outlying cairns.



*Photo 10: Rooms 2 and 3, which lie just downslope from the ridgepoint and the major features at Wizard's Roost, are indistinctly defined by slightly cleared spaces and low, loosely stacked walls.*



## ESTIMATES OF SITE AGE BASED UPON PRECESSION

No artifactual materials could be located at the Wizard's Roost site. Although indirect evidence (the patination of the masonry, the extensive lichen growth, and the astronomical data presented below) pointed to some degree of antiquity, no direct means of dating the site was available.

However, an examination of the potential alignments of the site's features revealed several possible stellar orientations. In consultation with Charles Hyder, these alignments were examined to determine whether any might have indicated the heliacal rising point of a particularly bright star in the past. This approach had already proved successful at several of Eddy's sites (1977) and offered a potential means of dating the site, possibly establishing the identity of the builders as well.



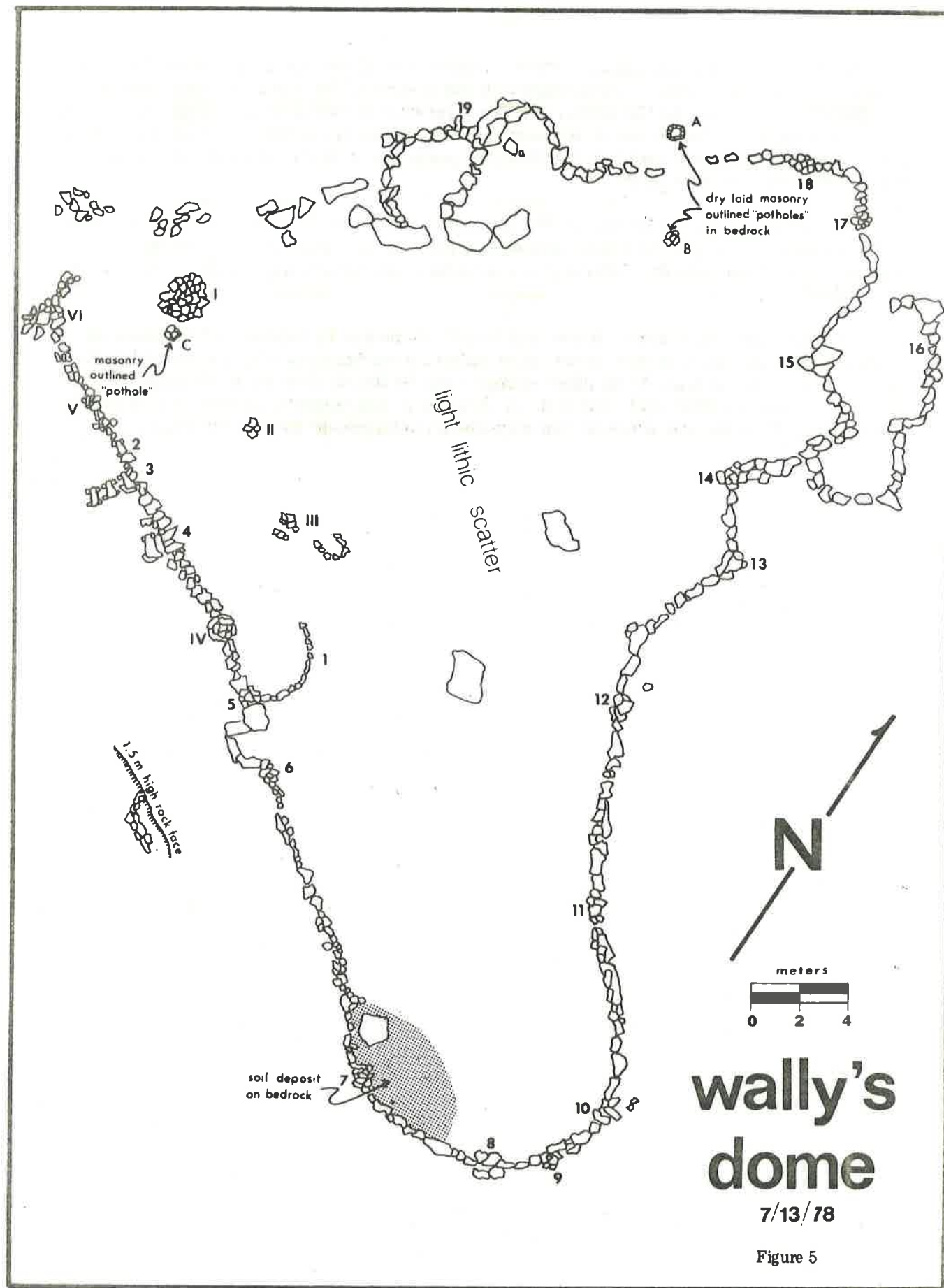
*Photo 11: Extensive lichen growth on the rock construction at Wizard's Roost indicated that the site was not recent and remained undisturbed.*

This indirect method of dating depends upon the gradual precession of the equinoxes, caused by the slight "wobble" of the earth's rotational axis. This precession results in a gradual westward shift in the equinoxes versus the celestial sphere, and thus in the rising points of stars. This shift proceeds at a slow but predictably steady rate, of approximately  $0^{\circ} 0' 50''$  per year. The differences in the azimuths indicated by an alignment, and the present rising point of a particular star, then, measure the elapsed time between the site's construction and use and the present. Dr. Hyder's preliminary calculations suggested that the main cairn-small cairn alignment may have indicated just such a heliacal rise of Sirius, one of the brightest stars.

In 1977, and on subsequent occasions, Hyder visited the site to determine the actual current rising point of Sirius in comparison with the suspected alignment. The small size of the site, the close proximity of the cairns, and the somewhat indistinct nature of the small cairn made the accurate measurement of precessional shifts somewhat difficult, but he was able to guess a site date of approximately 1,500 to 2,000 years ago, if Sirius was in fact the proper star (Hyder, personal communication).

Subsequent construction during the transition from tend to agree with this estimate, suggesting that both sites were constructed during the transition from the Late Archaic to Early Mogollon, coincident with the beginning of a sedentary, agricultural way of life in the Tularosa Basin region.

If other sites like Wizard's Roost and Wally's Dome can be located, and if similar alignments and features can be demonstrated, then additional confirmation of our tentative hypotheses can be brought to bear. If no other examples can be found, then the explanations offered here will remain tentative, and enigmatic, as they are at this moment, an architectural puzzle, an inheritance from the past which we can only pass on in its present form to the future.



## WALLY'S DOME – LA 20712

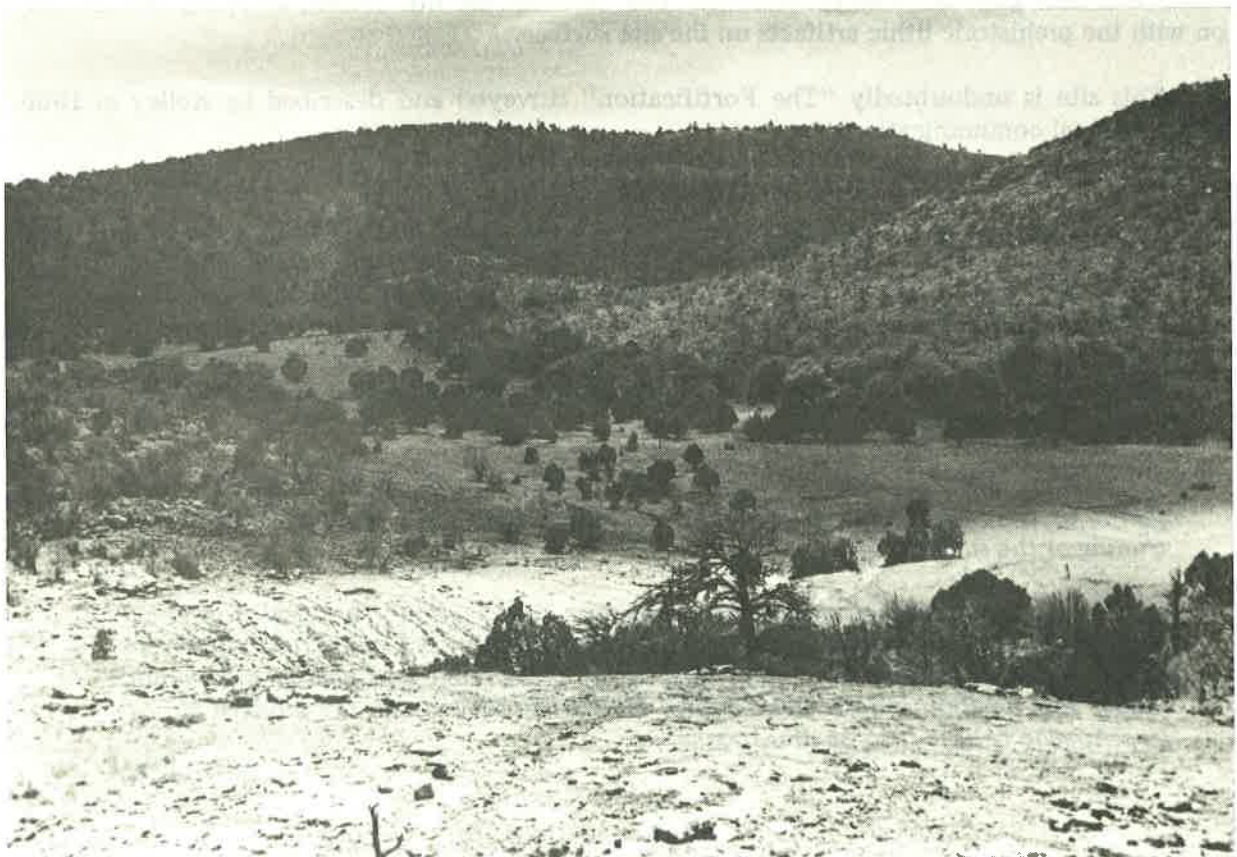
Otero County, New Mexico

Age: circa A.D. 850 to A.D. 1000

Elevation: 6,740 feet; 2,054 meters

### ENVIRONMENTAL SETTING

Wally's Dome occupies the top of a metamorphic dome along the eastern footslope of the Sacramento Mountains. The intrusive uplift which includes this dome has formed a narrow valley along the eastern slope of Pajarito Peak. Numerous seep springs occur along the base of the dome, and small intermittent streams flow along the lush valley floor. These bottomlands support a dense grama grass turf, interspersed with pinyon-juniper and oak woodland. Although slopes here are moderate to steep, erosion is slight and range condition is good. Numerous semi-arid species like cholla cactus and yucca create a diverse scrub community in the rocky areas associated with the intrusive rock uplift.



*Photo 12: This hidden valley below Pajarito Peak contains extensive evidence of prehistoric human occupation. Remnants of fire hearths are exposed in shallow erosional cuts, and projectile points recovered by BIA Timber Sale surveys indicate use during the early Jornada Mogollon period.*



From the top of the dome, the vista stretches across the eastern Sacramento pediment toward the distant Pecos Plains. North and south horizons are blocked by low ridges forming the footslopes of Pajarito Peak, immediately west. A fire lookout tower occupies the summit of the peak — the only evidence of modern human activity within view.

## SITE DESCRIPTION

This site consists of a series of dry-laid masonry features, including stacked rock cairns, natural rock, water catchments outlined with masonry, and an irregular low wall with numerous upright stone slabs at intervals along the southern and eastern wall exposures. These features occupy the top of a barren metamorphic dome formation in the eastern foothills of the Sacramento Mountains. This rock dome and lower associated intrusive rock to the south have formed a small valley just below Pajarito Peak, immediately west of the site.

The rock features comprising the site have been constructed from naturally spalled slabs of brown stone eroding from the dome surface.

A light scatter of chipped stone, primarily debitage (or waste products from stone tool manufacture), lies on the shallow surface of the walled enclosure, in areas where the wall has blocked surface runoff. Weathering of the exposed surfaces of rocks used for construction and extensive lichen growth indicate that the rock features are not recent, allowing the association with the prehistoric lithic artifacts on the site surface.

This site is undoubtedly "The Fortification" surveyed and described by Kelley in 1966 (1979, personal communication):

*A bare granite knoll rises . . . . . above the valley floor. The top, which is fairly flat, is rimmed with a wall made by stacking irregular granite slabs. The wall, still 3 feet high in places, surrounds an area about 150 feet by 90 feet at its widest dimensions. Natural depressions within the enclosure are also rimmed with granite slabs and a pile of these slabs stands at the southwest corner. A second wall on the north slope may be a lookout post. A permanent spring is located at the southeast edge of the knoll.*

*There were no artifacts within the enclosure. Arrow point tips and several sherds of an undecorated cream colored pottery with large temper particles protruding at the surface were found around the base of the knoll.*

*It is assumed that this was a prehistoric fortification. The knoll top could have been defended against spears or bows and arrows on the valley floor; however, firearms placed at the higher elevations of the valley edge and nearby hills would render this location indefensible. Ernest McDaniel told me that the modern Mesca-lero Apache believe it to be pre-Apache.*

(Kelley 1966)





*Photo 13:*

*The area enclosed by this low rock wall at Wally's Dome is generally bare, although thin accumulations of soil have formed in localized areas in northern and eastern (foreground) portions of the site.*

Kelley's interpretation, and the site name, are not at all surprising. As early as 1875, the site appears on Morrison's Army Corps of Engineers map of the District of New Mexico, labeled "Old Fortifications". Evidence that this designation persisted for at least 40 years appears on a commercially produced (and reproduced) road map of Arizona and New Mexico which postdates 1910 (HSR archives). On this map the same location is shown, labeled "Old Fort". The persistence of this general designation in a remote area on the Mescalero Reservation suggests that this may represent a local place name rather than merely a descriptive term.

Recent investigations by Human Systems Research, and intensive surface survey by BIA archaeologists, confirm the prehistoric nature of the site and suggest that, although the site may have been defensible, its primary function was astronomical.

## MAJOR SITE FEATURES (Figure 5)

At least six types of features can be distinguished at the site. All have been constructed in a simple, dry-laid fashion from the natural rock spalls which litter the top and sides of the dome.

### THE ROCK WALL

This irregular wall encircles most of the level area on top of the bare rock dome. Wall height averages 50 cm. Wall elements are of a variety of sizes, including large (in excess of one meter) boulders probably in place at the time of construction. The wall incorporates a variety of upright features, including a formally constructed cairn, formally placed upright slabs and small arches, and numerous single slabs and informal cairns. Additional wall construction in two areas has resulted in two pairs of room-like, smaller enclosures.



*Photo 14: Most of the encircling rock wall at Wally's Dome is informally constructed. Upright stones (like Feature 10 just to the left of the author), however, have been carefully braced with smaller stones, and remain quite stable today.*

### FORMAL CAIRNS

One tall (1.4 meters), cribwork-constructed cairn (IV) is incorporated within the wall itself. A single course wing-wall (Feature 1) is associated. A second cairn (VI) may have existed at the westernmost end of the wall. A third cairn (V) occupies a position within the wall between IV and VI. A large, broad-based cairn (I) occupies the western corner of the enclosure, and



*Photo 15: The winter solstice sunrise alignment between cairns I and II (see photo 19) does not exactly indicate the converse summer sunset because of the angular elevation of the apparent horizon of Pajarito Peak.*

another smaller cairn (II) lies immediately southeast. Scattered rocks further southeast may represent a third (III).

Two other isolated rock cairns occur outside the wall enclosure, one to the north and one southwest.

#### **FORMALLY PLACED UPRIGHT SLABS**

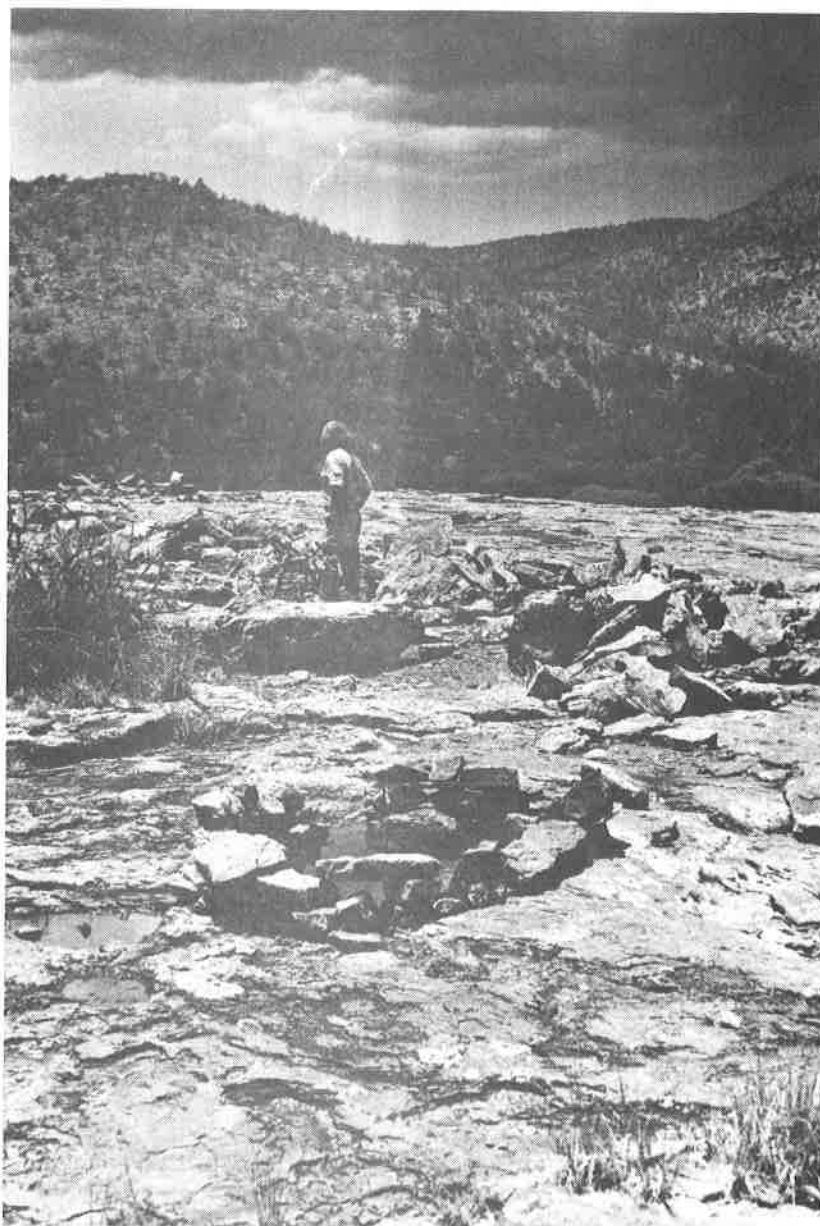
Two locations (Features 3 and 4) along the wall are marked by twin upright slabs, which resemble sighting devices. The slabs used are exceptionally long and narrow, and have probably been carefully selected. Both of these paired slab features are associated with low stone arches, resembling seats. In one example (Feature 3) these associated arch-like features occur in a row of three lined up behind the paired uprights (see photo 17).

### ADDITIONAL STONE ARCHES

Two small arch-like features (Features 2 and 16) are incorporated within the wall itself. The construction of both suggests that they may have been another form of sighting device, rather than a seat or bench (see photo 17).

### NATURAL CATCHMENT DEPRESSIONS WITH WALLS

At least three natural depressions, two (B and C) within the enclosure, and one (A) just outside, have been ringed with a two to three course, low wall. A fourth depression (D) may also have had an associated wall. These encircling walls are all of loosely laid natural rock, and do not function to increase the water holding capacity of these depressions.



*Photo 16: The purpose of this and two other walled catchment basins at Wally's Dome is not known. All three which remain intact are quite shallow and more reliable sources of fresh water are available from numerous seep springs along the south base of the dome. Could these shallow pools also be sighting devices?*

*Hyder has recently pointed out that the 4% reflections typical of still pools of water are good viewing surfaces for observations of the sun, particularly during solar eclipse.*

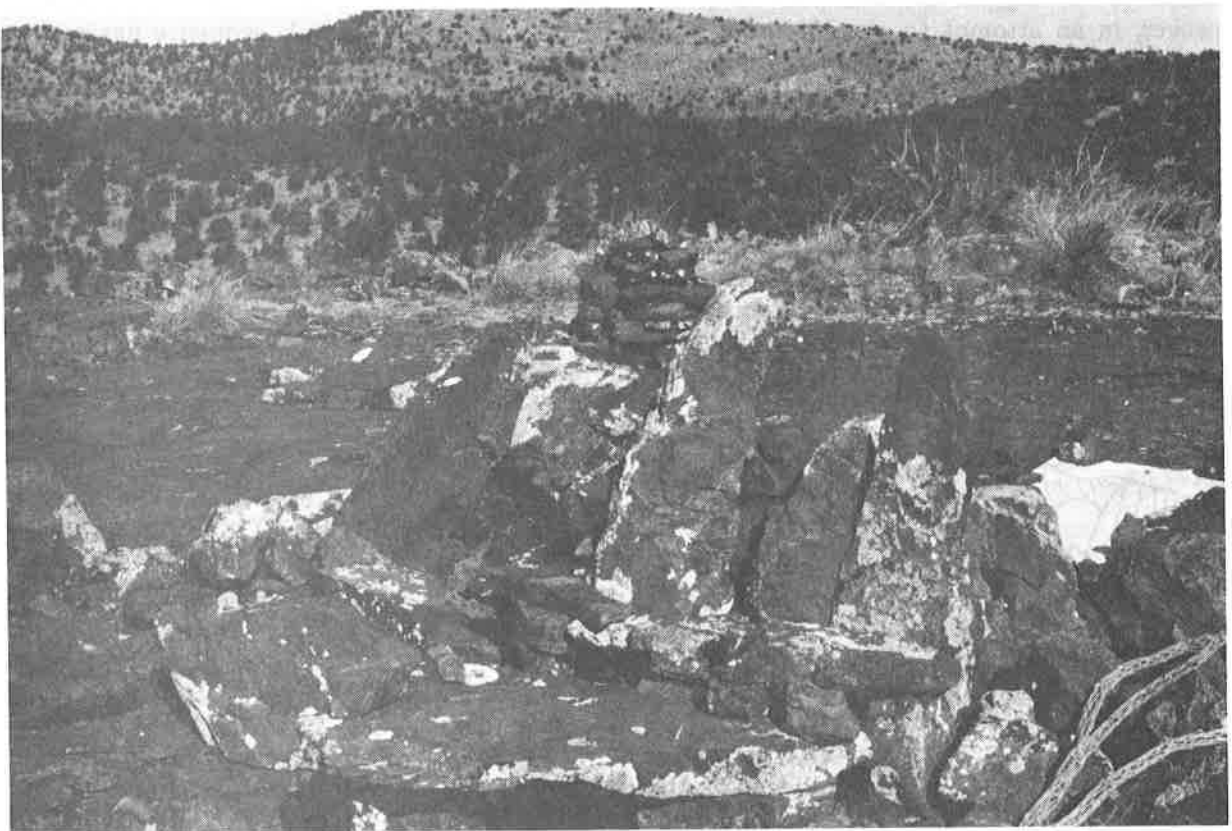


### PAIRED ENCLOSURES ("Rooms")

Additions to the main encircling wall, often incorporating large and apparently naturally located boulders, have resulted in two pairs of smaller enclosures. These bear a strong resemblance to the indistinct "rooms" noted at Wizard's Roost. The shapes of these enclosures are irregular, and wall height and method of construction is essentially identical with that of the main wall.

### CERAMICS

Plain, cream colored ceramics with protruding rock temper, identical with those found by Kelley (personal communication) were also noted along the sides of the dome, below the site. These remain unidentified; they are clearly distinct from any of the local wares, most resembling Anasazi Lino Plain wares typical of the northern half of New Mexico during a contemporary period (Marshall, personal communication).



*Photo 17: All major wall features, like these paired uprights (Feature 3), were marked with white photo panels prior to aerial photography by Thomas Mann & Assoc. during winter solstice, December 1980.*

## LITHIC REMAINS AT WALLY'S DOME

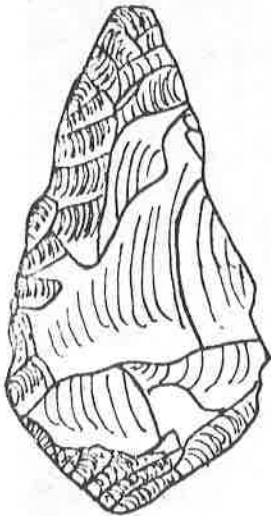
By Cyé Gossett

### INTRODUCTION

During the past two years, several archaeological investigations have been carried out at the Wally's Dome site. In July 1978, Human Systems Research visited the site for the first time and later in June of 1979 conducted the first lithic analysis at the site itself. In the fall of 1979 the Bureau of Indian Affairs Timber Management Program Archaeological Survey conducted more extensive investigations providing additional data for Wally's Dome and several sites located in the valley below. Each study has produced cumulative information about the lithic assemblage at the site. An in depth evaluation of these separate analyses will not be undertaken here, but rather, a more cursory look at possible "diagnostic" artifacts seems in order.

### PROJECTILE POINT MORPHOLOGY AND THE ASSEMBLAGE

Several projectile point types were located by the HSR and BIA surveys near the dome and in the general vicinity. Distinct cultural and temporal classifications of diagnostic projectile point styles are poorly developed in the southeastern New Mexico region. In 1978, Robert Leslie compiled a projectile point sequence for the eastern Jornada-Mogollon (Leslie 1978). Leslie does not suggest that his point sequence might be applicable in the Wally's Dome area. However, in an attempt to classify those points found at the site, Leslie's sequence has been consulted. Point types, their description and approximate dates, which correspond with Leslie's sequence, are as follows (Note: Illustrations not actual size):



A. Triangular, straight to slightly convex, with no notches. Leslie suggests this style might be a preform for another type of point. He dates it from A.D. 950-1000 to A.D. 1500.

(Chert)



B. Triangular, with convex edges and corner notches. Dated at the preceramic Hueco Phase up to A.D. 950.

(Chert)



(Chert)

C. Triangular with rounded shoulders and an expanding stem. The base is convex and has approximately the same width as does the shoulder. Dated from A.D. 850 to 1000 in the Late Hueco and Early Querecho Phases by Leslie.



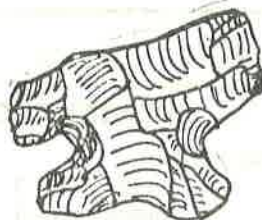
D. Triangular with extra wide side notches and a convex base. Dated at A.D. 850-1000.

((Chert))



E. This type may be the same as C above. Dated at A.D. 850-1000; also Late Hueco.

(Chert)



F. Leslie gives no direct date for this type but suggests that it was manufactured prior to the Hueco Phase.

(Basalt)

Leslie's point sequence suggests dates of A.D. 850-1000 for this site, during the Hueco Phase of the Jornada-Mogollon sequence. Culturally, these dates are probably indicative of Late Archaic through Early Mogollon. In addition to the projectile points, other components of the lithic assemblage were recorded by the 1979 HSR survey, including bifaces and fifty or so nondescript flakes and angular fragments. Again, in December of 1980, additional lithic analyses were conducted by Human Systems Research at the site. All visible lithics on top of the dome were inventoried as encountered. Within that inventory, 57 items were measured and analyzed. This sample included:

- 18 angular fragments (10% with dorsal cortex)
- 34 flakes (90% with no dorsal cortex)
- 2 proximal fragments from projectile points
- 3 bifacial preform fragments

The absence of high percentages of dorsal cortex on angular fragments and flakes, as well as the presence of unutilized bifacial preform fragments, suggests a tertiary stage in the manufacturing process. These assemblage attributes are indicative of actual tool manufacturing rather than first and secondary raw material reduction from which a piece of raw material might be selected for further modification. Rejected bifaces would probably have been manufactured into projectile points and small cutting or scraping tools had they not been broken and discarded on the top of Wally's Dome.

## SUMMARY

The Wally's Dome lithic assemblage suggests an occupation in the site vicinity from the Late Archaic to Early Mogollon. The flakes, angular fragments and broken preforms suggest tool manufacturing activity on the dome itself rather than hunting or butchering or processing tasks.

## SUMMARY OF SOLSTICE ALIGNMENTS

Solar Event	Azimuth	Year Confirmed	Backsight	Foresight	
<b>WIZARD'S ROOST</b>					
WINTER SOLSTICE		1977-1978			
Sunrise	115°		inside Room 1	Pajarito Peak	sun rises just east of Peak
Sunset	235°		inside Room 1	Sierra Blanca	sun traverses north ridge, from peak to end of ridge where it winks out.
SUMMER SOLSTICE		1978			
Sunrise	63°		inside Room 1	saddle	sun rises in saddle along extreme end of nearby ridge.
Sunset	298°		inside Room 1	notch w/cairns	notch between two small ridge peaks — two small, unidentified rock cairns on southerly ridge peak.
<b>WALLY'S DOME</b>					
WINTER SOLSTICE		1980			
Sunrise	118.5°		main cairn	small cairn	sun rises from a depression along the distant horizon which marks the lower Penasco drainage.
Sunset	(unobserved due to weather conditions)				
SUMMER SOLSTICE		1979-1980			
Sunrise	@ 63°		Feature 2 cairn V	small cairn cairn II	sun rises at a shallow notch along a nearby ridge line.
Sunset	293°		tall cairn IV	cairns V & VI Pajarito Peak	sun sets directly into the southern edge of the peak itself.

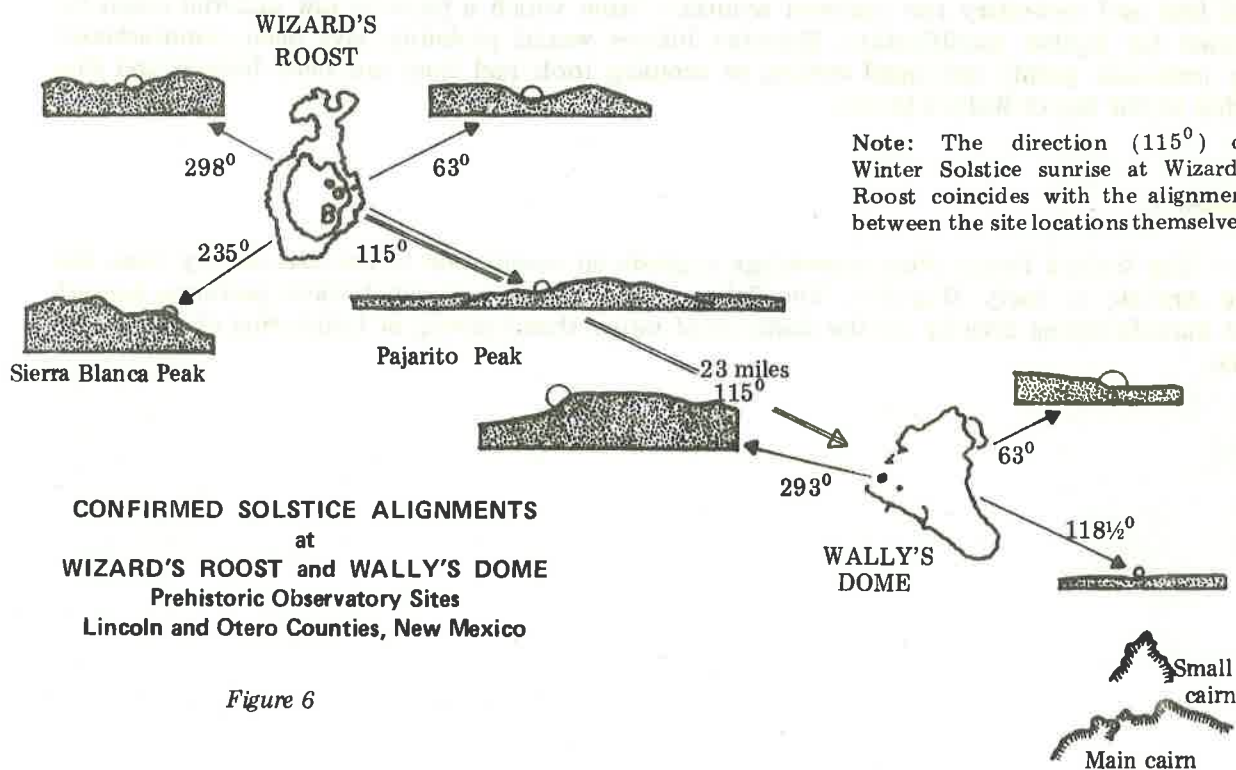


Figure 6



*Photo 18: Summer solstice sunrise, June 21, 1980, at Wally's Dome, seen through Feature 2.*



*Photo 19: The alignment between the main cairn (I) and the smaller cairn (II, visible just beyond) indicate the winter solstice sun, rising in the slight notch created by the Penasco drainage as it joins the Pecos.*





*Photo 20: Summer solstice sunset at Wizard's Roost drops behind a ridgeline along the Sacramento crest which may have been marked by the two rock cairns located during the original 1977 survey (see map, p. 40, Wimberly and Eidenbach 1977).*

## SUMMARY AND SIGNIFICANCE

Solar and celestial observatories have long been recognized in association with prehistoric urban civilizations throughout the world. Well established traditions of astronomical observation, commonly in a religious context, are documented among the ancient Egyptians, Chinese, Maya, Greeks, Babalonians, and many other state societies. Most frequently, these observatory traditions are embodied in major architectural features and orientations, and have survived in fragments of each civilizations' written record. Until the last few decades, however, earlier and less elaborate examples dating prior to recorded history, remained unrecognized. Hawkins' (1965) "decoding" of Stonehenge in England established clearly the existence of earlier observatory structures, and opened speculation concerning the actual purpose of other megalithic monuments scattered throughout the Old World.

In the southwestern and western United States, recognition of similar features has been more gradual, due in part to lack of written records. This gradual recognition was also slowed by the mistaken assumption that astronomy was a consequence of complex society, rather than an elaboration of a much older human perception. Groups considered "primitive" were thought to be incapable of the precise and long term observations necessary for a predictive understanding of celestial motion. In addition, scant attention had been paid to the possible adaptive significance of primitive astronomy. Reyman (1976) has since presented a convincing argument demonstrating that adaptive value which has particular application to the Southwest. He states:

- (i) *At most latitudes, celestial observations allow the group to predict seasonal changes in order to better plan and implement the sequence of events in the adaptive strategy, be it farming or some other system. Although such observations do not ensure success every year, if interpreted correctly, careful long-term observations do tend to increase the chances of success. Foreknowledge of the general pattern of seasonal changes is necessary for dealing with the frost problem, and, if the group anticipates the onset of the potentially destructive summer rains, then the water-control systems can be modified and repaired in preparation for them.*
- (ii) *The sun, with its apparent yearly south-noth-south passage (winter-summer-winter) along the horizons, is the single most reliable celestial body for establishing the calendar on which the understanding of seasonal changes is predicated. Certain stars and constellations (for example, Sirius, Orion, and the Pleiades) and the moon are useful as nighttime checks on the sun's position, particularly when atmospheric conditions like cloud cover and rain temporarily prohibit the direct observation of sunrise and sunset.*
- (iii) *While there are a number of possible recording techniques, including the use of shadows, the most permanent of reliable technique involves the use of architectural features as sighting devices.*

Reyman (1976:959)

Reyman has also summarized the existing southwestern ethnographic record of celestial observation (1971, 1975) and he concludes (1976:959) that "*The ethnographic records indicate that . . . solar observation is the most common and important type of astronomical record-keeping . . . celestial observation is usually made in conjunction with or from a particular structure or architectural feature. Once the pattern of celestial movement is recorded, a permanent record is usually made by aligning some architectural feature to the path of motion . . . some architectural feature is astronomically aligned, often with a natural topographic feature as a foresight*" (emphasis by author).

Not surprisingly, the clearest examples of celestial observatory features in southwestern archaeological sites are often in the larger, excavated ruins, like Pueblo Bonito and Casa Grande. In part, this has been due to the extensive and often early research which has been undertaken in these more spectacular sites. Only recently have similar celestial orientations begun to emerge in smaller residential sites (Brook 1979).

By contrast, the observatories at Wizard's Roost and Wally's Dome (and Eddy's Medicine Wheel sites) represent isolated structures. They are not associated with centers of population, are relatively devoid of both artifactual materials and architectural structures, and may be typical of high rather than low elevations. Crudely laid rock cairns, small and indistinct rooms, ragged lines of piled stones; this apparent simplicity almost disguises the underlying complexity in these barren alignments. Their significance, however, should not be underrated. These features clearly demonstrate that solstice and stellar knowledge and observation were not limited in the New World to developed urban civilizations.

Two factors further suggest that similar observing systems may indeed have been quite widespread throughout pre-Columbian North America. First, the Plains "Medicine Wheel" sites documented thus far by Eddy, span a period of 2,000 years, and persist throughout a period of rapid evolutionary development from a generalized hunting and gathering tradition (resembling earlier Plains Archaic periods) to the highly specialized, equestrian, nomadic traditions of the historic Plains tribes (Willey 1966). By contrast, general patterns of Puebloan culture in the Southwest did not undergo such massive and rapid adaptive changes during the same period. Persistence of observational traditions in the diverse environments of the Northern Plains and the Southwest, under differing degrees of cultural change and adaptation, point to both a universal perception and deeply rooted multiadaptive technological strategy.

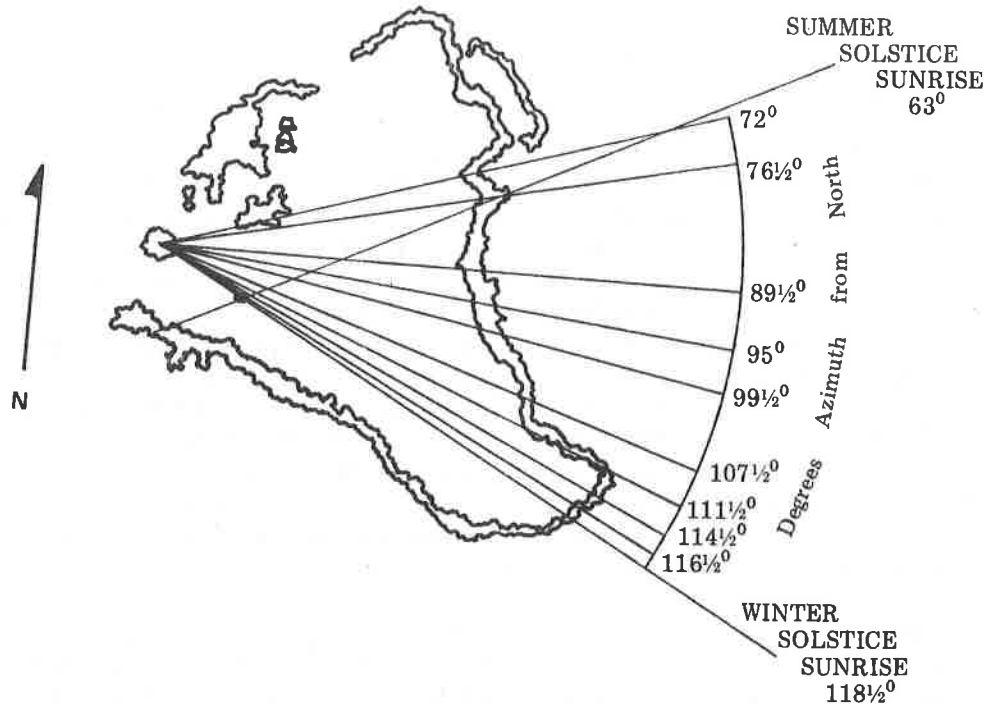
Second, a striking degree of similarity is evident in the basic features of both astronomical traditions. In addition to the expectable commonality of solstice observation, both the Plains sites and the Southwestern sites reported here suggest alignments to bright stars exhibiting a heliacal (rising with, or just before the solstice sun) rise at the time of site construction. Whether the two traditions are strictly independent, or stem from some older, as yet undiscovered predecessor, remains unknown at this time. In either case, however, the diversity represented by all these sites, in subsistence, economy and social organization, strongly suggests that this particular pattern may be quite basic, and highly adaptable to a great variety of environmental and cultural circumstances.

The apparent rarity of these types of observatory sites is due to a variety of factors. Recognition of the astronomical character of these types of sites is a relatively new perception, and informed investigations have just begun. In addition, most of these sites are quite isolated, and often occur at high elevations, areas where little exploration has been undertaken. Most are somewhat fragile. Many similar dry-laid masonry structures may already have been sufficiently displaced to render recognition difficult or impossible. The best intact examples may be limited to locations remote from modern human activity, where the plow prevails.

The analysis and interpretation of the sites at Wizard's Roost and Wally's Dome have just begun. As additional observations and examples are reported, greater detail will emerge. As observations and analytic techniques become more sophisticated, the great numbers of potential alignments between features at sites like Wally's Dome can be investigated. Thus far, attention has generally been focused on verification of the solstice alignments to confirm the astronomical character of the sites. The complexity of the interpretive tasks which remain cannot be overstated. At least two approaches, or a combination thereof, seem immediately productive. Both will require sophisticated equipment and interdisciplinary expertise. A first approach might rely on a mathematical simulation of all possible alignments and a selection of those combinations of features which demonstrate goodness of fit with both the azimuths of the brightest stars and with the estimated dates of construction and use of the site. A second approach would involve an inductive investigation of visual simulations using planetarium facilities. These two serve merely to point out the possibilities. Many other approaches undoubtedly exist — planetary conjunction, novae, comets, and large meteorites — and their cultural impact, both past and present, have yet to be considered, much less investigated.

WALLY'S DOME  
POTENTIAL ALIGNMENTS BETWEEN  
THE MAIN CAIRN AND SELECTED UPRIGHT FEATURES  
ALONG THE EAST WALL  
(Based on aerial photography by Thomas Mann and Associates, 1980)

Figure 7



Among the more obvious problems remaining is the function of the numerous uprights along the eastern portion of the wall at Wally's Dome. The fact that these features are generally restricted to the eastern wall, between the solstice axes, suggests that their use may have related to the rising point of particular celestial objects. We will limit the possible alternative explanations, for purposes of example only, to the following three:

1. Upright features may represent a series of solar markers arbitrarily dividing the seasons between solstices;
2. The uprights may represent individual alignments to a number of bright stars, and might represent seasonal divisions based on the heliacal rise of different stars during the year.
3. Sets of upright features may mark a sequence of stellar positions, with new markers erected as old ones become inaccurate due to the tiny precessional changes (this would imply a degree of observational precision comparable to most sophisticated modern observing facilities!).

The significance of interpretive problems such as these is of great interest for both cultural-historical and ecological reasons. Much of the prehistory of North America may be linked to both the possible antiquity and universality of such primitive observational systems, as well as to the particular adaptive success of particular groups versus others. So far, we possess too little data to answer any of these questions, which makes the prospect of what we have missed in the past all the more enticing.

The bulk of this report has restricted itself to the purely material and technological character of the solstice observatories at Wizard's Roost and Wally's Dome. This is as it should be. Modern archaeology is materialist in outlook and pragmatic in method. Arguments based on ideologies are inherently fallacious for scientific purposes because no data exist to confirm or deny.

\* \* \* \* \*

Nonetheless, for reasons personal, professional and, indeed, human, something of these ideas must be said, lest we forget that ideas, great and small, form the true motivation in all of us, past and present.

The predominance of the sun in American Indian myth and ritual is amply demonstrated in the ethnographic record. Until recently, however, this emphasis, by no means unusual throughout the world, has been viewed almost solely as symbolic and ideological. Seldom has the potential adaptive character of myth and ritual been addressed. Seldom have we admitted the pervasive influence of scientific inquiry and formalization among societies throughout human history. Yet it must be clear that our ancient forebearers, less insulated from their environment, were more aware of the course of the heavens than their modern counterparts. Before the advent of the conveniences we regard as necessities, human groups were highly responsive to and aware of the rhythms and cycles of planetary motion. That knowledge has been embodied in the uniquely human adaptive repertoire we term culture, and finds constant expression in the mythic and artistic achievements of our species. From our modern perspective it is not surprising that we have forgotten the accuracy of earlier perceptions. We have dismissed primeval empiricism by refuting basic explanatory assumptions. Nonetheless, ancient testimony remains, awaiting rediscovery by its own technological descendants.

As we apprehend anew those achievements of the past, the mute monuments to the sapient struggle which began such a short time ago, we are drawn to themes constant throughout our evolutionary history: the outward search which leads inward, the universe which has given us birth, nurtured and sustained us, and awaits.

There is irony in of the rediscoveries reported here. Solar observation continues in the Sacramento Mountains both at the modern facilities at the Sacramento Peak Observatory and at the more ancient sites; Wizard's Roost, Wally's Dome, and locations which remain undiscovered at this time.

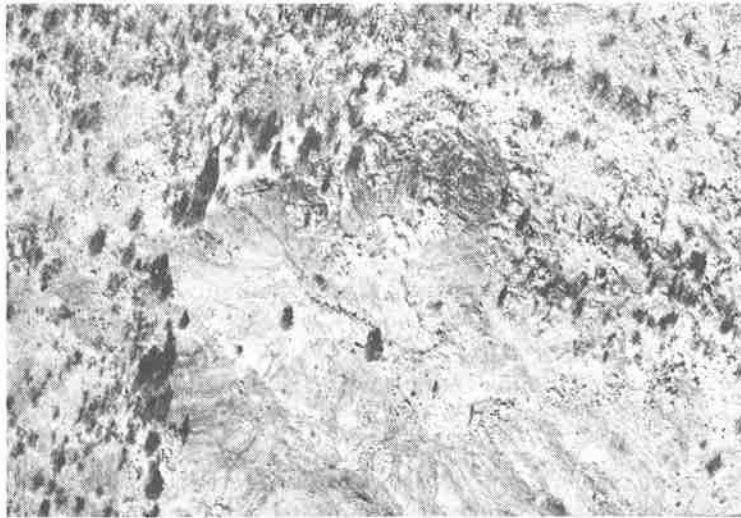
A series of patterns emerges upon reflection. The first is systematic. The two archaeological sites reported here typify the all too human quest for prediction. The second is evolutionary as well as constant. Human manipulation and control of environment often utilize a perspective which exceeds individual lifespan, a discipline which is culturally cooperative, and a faith which must be sustained anew by every generation.

The outward search differs only in the degree of technology or lack thereof which the species or the individual can bring to bear on these non-local problems. The motivation and commitment remain constant and identical.

Scott Momaday (1969) speaks of this journey, and quotes his people, the Kiowa, thus:

*There were many people, and oh, it was beautiful. That was the beginning of the Sun Dance. It was all for Tai-me, you know, and it was a long time ago.*





*Photo 21: Stereo aerial photography by Thomas Mann & Associates has allowed extremely accurate measurements of alignments of features at Wally's Dome. (Nominal scale 1:2400).*



*Photo 22: Major site features at Wally's Dome are readily visible in this enlargement of the original aerial imagery.*

# REFERENCES CITED

- Brook, Vernon R.  
1979 An El Paso astronomical observatory. In *Jornada Mogollon Archaeology*, P.H. Beckett and R.N. Wiseman, Editors.
- Eddy, John A.  
1974 Astronomical alignment of the Big Horn Medicine Wheel. In *Science* 184(4141): 1035, June.  
  
1977 Medicine wheels and plains Indians. In *Technology Review* 80(2):18, December.
- Eidenbach, Peter L.  
1979 Wizard's Roost and Wally's Dome, continuing investigations of prehistoric observatory sites in the Sacramento Mountains. In *Jornada Mogollon Archaeology*, P.H. Beckett and R.N. Wiseman, Editors.
- Hawkins, Gerald S.  
1965 Stonehenge decoded. In *Megaliths, Myths and Men: An Introduction to Astro-Archeology*. Doubleday, New York.
- Kelley, Jane H.  
1966 The archaeology of the Sierra Blanca region of southeastern New Mexico. Unpublished Ph.D. dissertation, Harvard University, Cambridge.
- Leslie, Robert  
1978 *Projectile point types and sequence of the eastern Jornada-Mogollon*. Transactions of the 13th Regional Archaeological Symposium for Southeastern New Mexico and Western Texas.
- Momaday, N. Scott  
1969 *The way to Rainy Mountain*. University of New Mexico Press, Albuquerque.
- Reyman, Jonathan E.  
1971 *Mexican influence on southwestern ceremonialism*. University Microfilms, Ann Arbor, Michigan.  
  
1975 *Archaeoastronomy in pre-Columbian America*. A.F. Aveni, Editor. University of Texas Press, Austin, pp. 205-215.  
  
1976 Astronomy, architecture and adaptation at Pueblo Bonito. In *Science* 193(4257): 957, September.
- Willey, Gordon R.  
1966 Archaeological frontiers and external connections. In *Handbook of Middle American Indians* 4. Robert Wauchope, Editor.
- Wimberly, Mark L. and Peter L. Eidenbach  
1977 *Inventory of the cultural resources: Sierra Blanca ski area land transfer*. Human Systems Research, Tularosa, N.M.