VISIONS OF THE SKY

ARCHAEOLOGICAL AND ETHNOLOGICAL STUDIES OF CALIFORNIA INDIAN ASTRONOMY

Robert A. Schiffman, editor

Figure from CA-SBA-1380, Cave C.
Illustration by K.M. Conti.

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ASTRONOMY, MYTH, AND RITUAL IN THE WEST SAN FERNANDO VALLEY

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Introduction

> For the peoples of antiquity, the sky was always overhead. What happened there repeated itself and these repetitions made it possible to structure time and the world, as they do for us today [Krupp 1978:1].

Archaeologists have recently begun to realize the potential significance of astronomy in hunter and gatherer societies. This new focus is a major departure from a traditional anthropological bias. In the past only agricultural societies were viewed as possessing any significant form of astronomical knowledge. Such knowledge, it was felt, stemmed from a functional need to establish an accurate calendar from which to gear the crucial planting and harvesting of crops to the seasonal cycles.

This emphasis on agricultural societies reflects traditional conceptions in anthropology, where hunters and gatherers have been viewed as being far less culturally complex or advanced than those societies possessing agriculture. Hunters and gatherers have, in fact, been perceived as being relatively simple social groups that were influenced far more by environmental factors than were agricultural societies, their resource base, although seasonal, requiring no specific form of calendar. Cultural development within hunting and gathering societies has been perceived by functional-cultural ecologists as resulting from crisis change, with stress resulting from population pressure and resource depletion being paramount in the evolutionary process of social stratification.

Newly published ethnographic data (Blackburn 1974, 1975; Hudson et al. 1977; Hudson and Underhay 1978) have had a pronounced effect on broadening our theoretical perspective. These ethnographic data suggest that for the Chumash as well as other California groups, a sophisticated astronomy and ritual calendar existed, which in the Late Period (A.D. 500 to Historic) formed the nucleus for ceremonial integration on a regional scale (Hudson and Blackburn 1978). A religious sodality known as the *'antap* cult was integrated within this ceremonial network for the organization and regulation of ceremonial activities, with the most important public ceremonies geared to astronomical events. The annual public ceremonies were the fall harvest (*Hutash*) festival, summer solstice, and winter solstice (*Kakunupmawa*), with the most important being the winter solstice ceremony.

The importance of ceremonial exchange among the Chumash was such that it has prompted certain anthropologists, such as Blackburn (1974), to note that significant interrelationships existed between the *'antap* cult and the economic system. Based on this information it becomes apparent that the importance of the internal dynamics of hunter and gatherer groups, such as religion and ceremonial interaction, has been greatly underestimated in the past.

Furthermore, it is apparent from information contained in the notes of John P. Harrington and C. Hart Merriam, as well as archaeological mortuary evidence, that a high degree of social stratification existed among the Chumash as well as other native California groups (Bean 1974). This stratification, previously thought to be restricted to horticulturists and some agriculturists, in-

cluded chieftainships, craft specialization (guilds), ritual cults and special calendars, an economy that utilized shell bead currency, and redistribution of goods by chiefs (Larson and Major 1974:2). Politically and regionally the Chumash were organized into a series of provinces with capital villages as well as at least two religious federations governed by the capital villages of *Muwu* and possibly *'Upop* (Point Conception).

Prior to this investigation, Hudson and Underhay (1978) had demonstrated the existence and potential importance of astronomy for the Chumash, based primarily on ethnographic information, along with possible archaeological evidence (i.e., Condor Cave as a solstice observation site and inferences concerning certain ceremonial paraphernalia). Based on the above it was revealed that the Chumash had, as members of the *'antap* cult, full-time astronomers (*'alchuklash*) and sun priests who presided over the large public ceremonies. Moreover, in terms of archaeological evidence for Chumash astronomy, an apparent relationship exists between some rock art and astronomical events, both for the purpose of celestial monitoring required for a calendar and for related ritual observances (Hudson and Underhay 1978:56, 58, 72). Since we began our studies, new archaeological evidence has been added (Hudson et al. 1979), suggesting that the occurrence of astronomically related sites is widely distributed throughout the state of California. Moreover, there is evidence which indicates that both direct and indirect forms of monitoring were used.

In light of ethnographic and archaeological evidence (though scant), our attention was focused on obtaining valid and credible information regarding ancient Chumash astronomy. This led us to the choice of our study area.

The Study Area

The relationship between astronomy and Chumash ceremonialism drew our attention to the West San Fernando Valley. Archaeological information indicated the presence of a bead shrine known locally as Castle Peak. The use of such a shrine during the winter solstice ceremony would be consistent with the existing ethnographic information.

This shrine (CA-LAN-511) is located in the West San Fernando Valley adjacent to the historic Chumash-Gabrielino village of *Huwam* (El Escorpion). Information obtained during archaeological test excavations (Romani and Tartaglia 1978) suggested that *Huwam* may have served as a host village for the large "public" winter solstice ceremony. Nearly 30% of all ecofactual material found at *Huwam* consisted of marine resources, an indication of strong ties with the coast. It is possible that most of the marine resources were brought in by members of coastal villages attending the winter solstice ceremony. The people most likely to have attended this ceremony would have been from those villages politically aligned within the *Humiliwu* province, namely *Humiliwu, Ta'l'op, Hipuk, S'apwa,* and *Huwam* (L. B. King 1969:40).

Moreover, there are two sites in the West San Fernando Valley, Burro Flats and CA-LAN-357, which contain unusually dense concentrations of rock art, including both pictographs and petroglyphs. The ethnographic literature contains many references that connect rock art to ceremonialism and often specifically alludes to astronomical relationships or purposes (Hudson and Underhay 1978). Owing to this evidence, we felt that the West San Fernando Valley would serve as a likely area for our archaeoastronomical investigations.

The primary questions we wanted to answer were: (1) is there archaeological evidence for prehistoric astronomy present within the study area? and (2) if so, what level of sophistication does the data suggest (e.g., what celestial bodies were being monitored, with what level of precision, and what was the capability of prediction)?

This paper deals specifically with the Burro Flats complex (archaeological sites CA-VEN-151 to CA-VEN-161) and Stoney Point (CA-LAN-357). Both contain rock art and midden de-

posits. Specific questions asked were whether the sites represented observatories and/or locations for private and/or public rituals used for observations of celestial events. Furthermore, evidence was sought for two types of astronomical observations for these sites:

1. Direct observation: Intrasite solstitial alignments and/or patterning or rock art placement, and intersite solstitial alignments of sites or rock art loci to a central site (i.e., horizon markers).
2. Indirect observation: The effect created by light on specific pictographs and concentrations of cupules (cup-shaped depressions) at the moment of solstice sunrise or sunset (cf. Hudson et al. 1979:47-51).

Methodology

The field methodology employed during this investigation was essentially that outlined by Thom (1967, 1971) and Hawkins (1973:285-307). For most initial readings, a Brunton compass and tripod were used. This setup proved quite useful since this compass comes equipped with a fairly accurate clinometer for taking horizon altitude readings. Its light weight enabled easy transport to the rock art sites during initial investigations, yet allowed us to make fairly accurate predictions of solstitial alignments. However, in instances that required precision, a transit or beam-and-arc alidade was used.

Maps were made of both sites using a beam-and-arc alidade and plane table. Due to the distances between rock art panels and site datum points, walkie-talkies were employed. Both maps were tied to the specific azimuth of Polaris. When using the Brunton compass to determine potential solstitial alignments, a True North declination of 15.5° was used, which is a less accurate indicator than Polaris (Figs. 1 and 2).

Considering the possibility that certain cupule and mortar concentrations could have astronomical significance, possibly depicting constellations or asterisms or celestial phenomena, pliofilm tracings were undertaken. The analysis of these tracings has yet to begin and consequently will not be presented in this paper.

The field work entailed testing numerous field research questions, primarily occurring during the winter and summer solstices of 1978-1979. This work was accomplished with the assistance of astronomers from California State University, Northridge, and Antelope Valley College, with helpful guidance from Edwin Krupp, of the Griffith Observatory, and Travis Hudson, of the Santa Barbara Natural History Museum.

The Sites

Burro Flats

The Burro Flats rock art complex has been of interest to archaeologists and laymen alike since the early 1950s, beginning with a rock art study conducted by Charles La Monk in 1953. Excavations were conducted by the Archaeological Survey Association in 1953, and by San Fernando Valley State College (now California State University, Northridge) field classes under the direction of Charles Rozaire in 1959-1960. Unfortunately no comprehensive report on these excavations has yet been published, with the exception of a partial artifact list published as part of the Arroyo Sequit report (Curtis 1959: Appendix V).

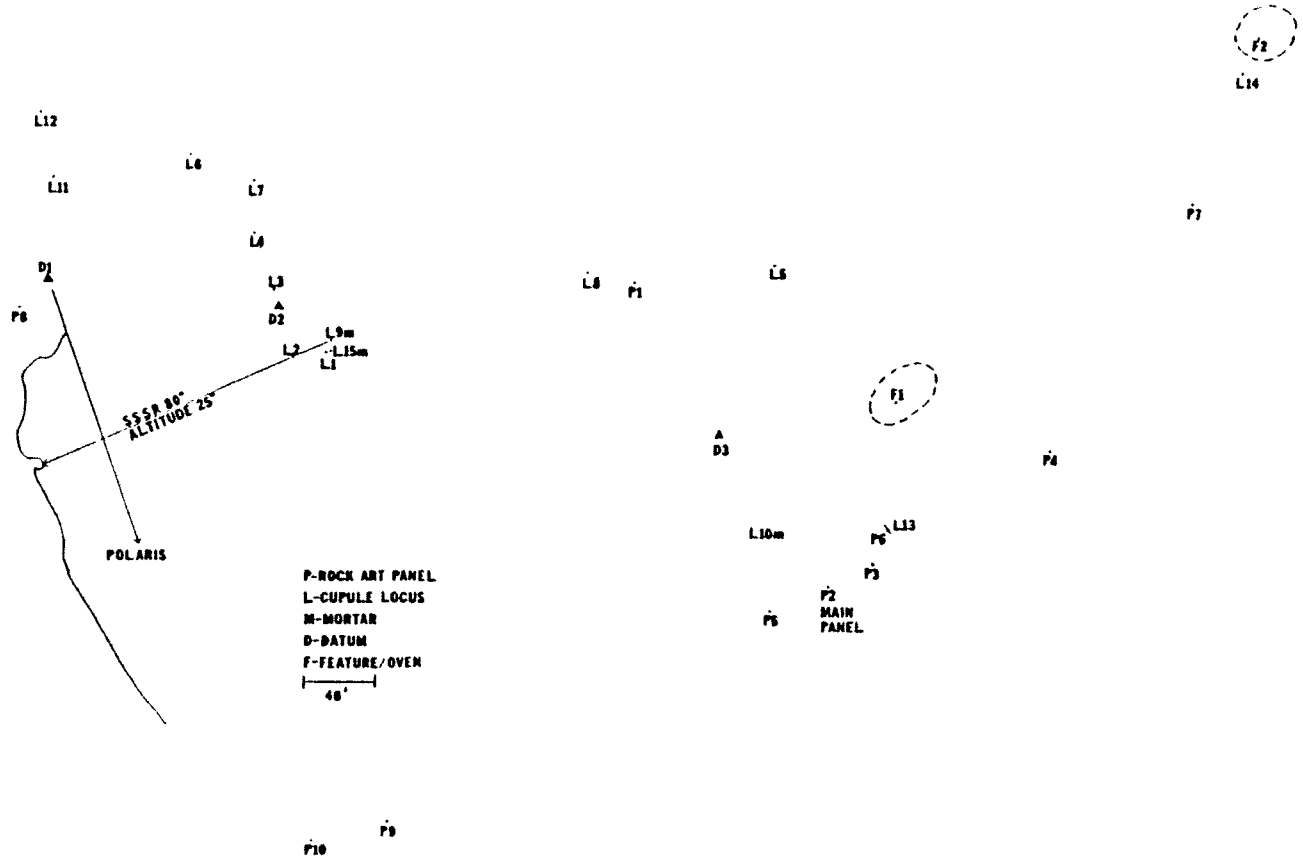


Figure 1. Burro Flats.

To date, at least eight pictograph panels and 14 distinct petroglyph concentrations (cupules, incised rocks, and mortars) have been located throughout the site, interspersed with areas of intense midden deposition. One pictograph panel stands out among the others, in that it is larger and far more complex. It contains both pictographs and petroglyphs (Fig. 3). There is little question that the Burro Flats complex, although originally treated as 10 distinct sites (now known to contain at least 21 distinct loci) represents specific activity areas within a single site. Moreover, this site is unquestionably ceremonial in nature, although its true complexity awaits proper analysis of the archaeological data.

Based on available data, this site appears to have a Late Period component, owing to the presence of Spanish trade beads. Although glass trade beads can by no means suffice to confidently date the rock art, given the potential for long-term use, the well preserved appearance of these pictographs does suggest recent origin. Cremations were reportedly recovered from a sandstone ledge situated west of the main pictograph panel. This ledge also houses three other galleries, further emphasizing the importance of ritual in this portion of the site. Although cremations are associated with Shoshonean people, including the Gabrielino, they are extremely rare for the Hokan speaking Chumash. It is quite possible that Burro Flats was occupied by both Chumash and Gabrielino people

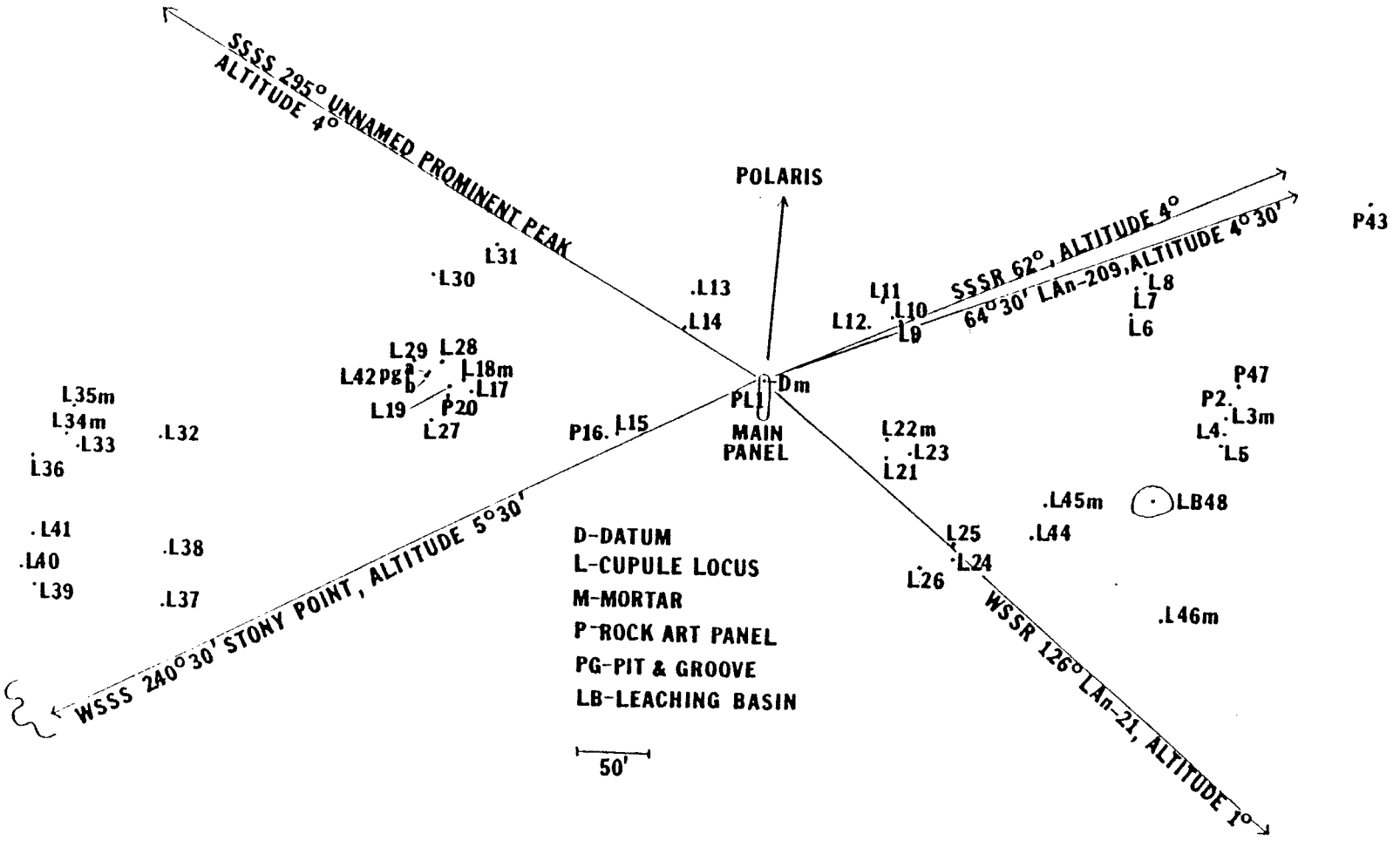


Figure 2. CA-LAN-357.

CA-LAN-357

This site was partially excavated in the early 1970s by Robert Pence of Los Angeles Pierce College and Ken Kraft of El Camino High School. As with Burro Flats, there has been no published report to date. The rock art at this site was, however, the focus of a study conducted by Sanburg et al. (1978:37). They concluded that, stylistically, the motifs were characteristically Chumash.

Situated throughout the site are 47 petroglyphs, consisting of either distinct cupule concentrations often associated with bedrock mortars, or isolated bedrock mortars, and at least seven pictograph panels. The rock art loci are interspersed between open pockets of concentrated midden. The likelihood is that more pictograph panels existed at one time, but have since been obliterated by the elements or other means.

Archaeological information suggests that CA-LAN-357 represents a village habitation site, although no ethnographic place name has been established. It appears to have been occupied from the Middle Period (1500 B.C. to A.D. 500) until historic contact (A.D. 1542-1796). Here also historic occupation is based on the presence of Spanish trade beads (John M. Foster, personal communication 1979). The extensive rock art at the site suggests that it had a significant ceremonial component which distinguished it from other villages.

Comparisons and Hypotheses

Both CA-LAN-357 and Burro Flats are very similar in their internal arrangement. Each site contains a number of cupule concentrations on both horizontal and vertical surfaces, interspersed with pictograph panels, most of them small, in sandstone fissures, and areas of midden. Most important, both sites have one panel which is inescapable more elaborate and larger than the others. Each main, or central, panel appears to be an integral element of its site and hence was a primary focus of our investigations. Only at Burro Flats are the pictograph design elements truly discernible, given their excellent preservation, whereas vandalism and weathering have almost totally obliterated the pictographs at CA-LAN-357.

The main pictograph panel at Burro Flats (Fig. 3) contains many motifs that resemble celestial bodies such as comets, meteors, stars, and the sun. These apparently celestial motifs and the southern exposure of the shelter housing the panel focused our attention on a potential winter solstice alignment. We hypothesized that at the winter solstice sunrise a particular set of concentric circles would be affected by light falling through a natural notch or archway in the face of the shelter. This site of concentric circles was first felt to symbolize the sun. A Brunton compass reading (azimuth 130°) taken from the circular design through the archway indicated that the design should indeed receive some light at the time of the winter solstice sunrise.

A unique concentration of cupules and bedrock mortars located at the southeastern part of the site was hypothesized to be a summer solstice observatory (Fig. 4). A large boulder containing a row of cupules (C), oriented 80° azimuth, pointed at a large notch near the horizon (E) with an elevation of 25°. These two features appeared to be aligned with the summer solstice sunrise.

Adding to the complexity of this area is a pattern of cupules ground into a boulder (D) and an isolated bedrock mortar (A). At the base of boulder C, in the sandstone bedrock, is a series of five mortars (B), graduated in size and resembling the toes and pad of a bear's paw. We wondered if they could have been used for ritual activities associated with the summer solstice ceremony.

Figure 3.
Main pictograph panel at Burro Flats
Red and Black figures White figures

At CA-LAN-357 the main pictograph panel is oriented west toward a conspicuous sandstone formation known as Stoney Point, and the hills separating the Simi and San Fernando Valleys. The jagged horizon seems to be well suited for both winter and summer solstice sunset alignments. Positioned on top of the shelter that houses the main rock art panel is a single bedrock mortar (Fig. 5). From this point we took compass readings for both solstice sunsets. Taking into account the elevation of the horizon, it appeared that a winter solstice sunset would occur on line with the summit of Stoney Point, and a summer solstice in line with a prominent peak on the horizon. Moreover, a summer solstice sunrise alignment was predicted with the main shelter and another rock art site (CA-LAN-209) that contains cupules. We hypothesized that CA-LAN-209 served as a summer solstice sunrise marker for the CA-LAN-357 main panel.

Results

Burro Flats

The summer solstice was monitored at Burro Flats on June 23, 1979, and again on June 21, 1980. The winter solstice was monitored on December 22, 1979. Since for Burro Flats there is evidence for both direct and indirect observations, they will be discussed separately.

Direct Observation: On the morning of June 23, 1979, an alignment with the summer solstice sunrise occurred, but not as predicted. From the isolated bedrock mortar (Fig. 4a) at 0758 PST, the sun's gleam could be seen filling the notch on the horizon (E), and by 0800 the disc itself began to appear. At 0804 the sun's disc was fully framed within this notch and by 0805 had moved above it.

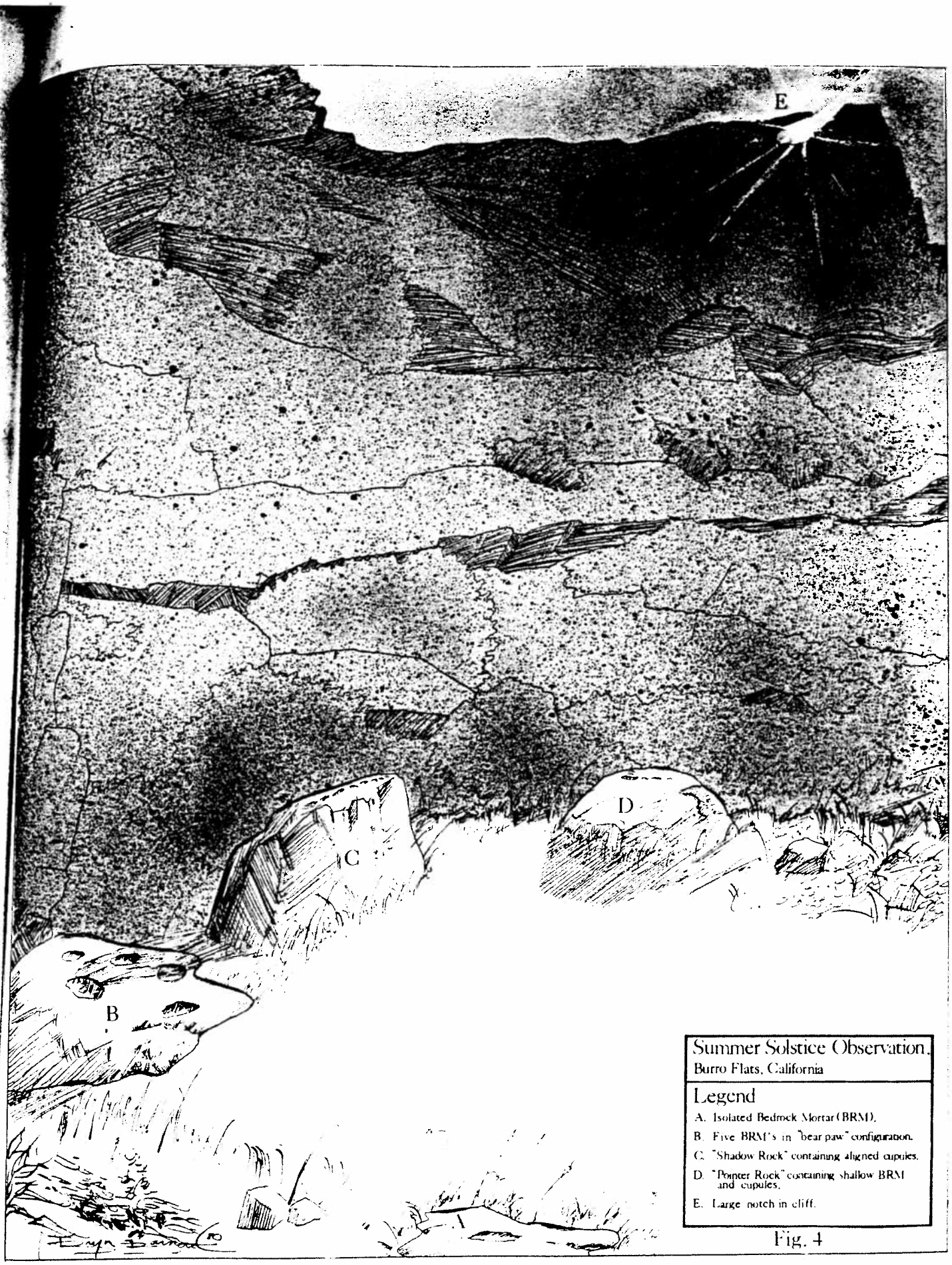
The predicted alignment between the "bear paw" configuration of five bedrock mortars (B), the linear cupule pattern (C), and the notch (E) did not occur. The sun's disc appeared on line with the linear cupule arrangement, but not with the center of the notch. Although only a little more than 4 m from the isolated mortar (A), the close proximity of the linear cupules to the notch on the horizon was enough to throw the alignment off.

It is important to note that no direct solstice alignments were observed for either the summer solstice sunset, winter solstice sunrise, or winter solstice sunset, from any monitored location within the site.

Indirect Observation: As observed from the main pictograph panel at Burro Flats on December 22, 1979, the winter solstice sun rose at azimuth 130° over a sandstone ridge (elevation 4°) at approximately 0700. Sunlight first bathed the outside surface of the shelter overhang, while the interior remained in shadow. At 0735, a triangular dagger of light penetrated through the natural archway and struck the concentric circle motif at the west end of the shelter (Fig. 6). This was as predicted.

At 0735 the beam lit up the third ring, pointed toward the center, and penetrated the second ring from the center. The dagger then receded and by 0750 rested on the outermost ring. At this time the dagger effect was lost, as the light expanded outward from the concentric circles and moved downward to the base of the panel, where it remained throughout the day. As the day progressed, the expanded and flattened "dagger" of light moved along the base of the panel, which appears to have been prepared by abrading. Once the light reached the base of the panel, only one pictograph and a number of cupules located along this prepared background remained illuminated.

Another set of concentric circles, located in the eastern portion of the shelter, was monitored at the winter solstice sunset, but the results were negative. No light touched this pictograph at the time of sunset.



Summer Solstice Observation
Burro Flats, California

Legend

A. Isolated Bedrock Mortar (BRM).

B. Five BRM's in "bear paw" configuration.

C. "Shadow Rock" containing aligned cupules.

D. "Pointer Rock" containing shallow BRM and cupules.

E. Large notch in cliff.

Fig. 4

Figure 5. CA-LAN-357.

At the time of the summer solstice sunrise, a shadow was cast off the large boulder containing the line of cupules (C) down onto the "bear paw" mortar configuration at its base (B). This shadow bisected one of the peripheral mortars, connecting it with the large central mortar (Fig. 7). This shadow effect lasted approximately 11 minutes, when it began to recede from the central mortar, finally disappearing by 0830.

CA-LAN-357

The summer solstice monitoring at CA-LAN-357 took place on June 21 and 22, 1979, whereas the winter solstice observations occurred on December 20, 1978, and again on December 19, 1979. Only direct observations were made. All were monitored from the main pictograph panel (see Fig. 5).

From a single small mortar situated on top of the large sandstone outcrop that houses the main pictograph panel, the winter solstice sun was observed setting behind Stoney Point (azimuth 240° 30', elevation 5° 30'). The rim of the sun's orb appeared to go down in line with the outermost edge of a large boulder on the highest portion of Stoney Point (Fig. 8). During the summer solstice sunset, from this same mortar, the top of the sun's orb went down in line with the top of a prominent peak on the horizon (azimuth 295°, elevation 4°) located about 4 km west of CA-LAN-357 (Fig. 9).

A predicted summer solstice sunrise alignment between the main panel and CA-LAN-209 (azimuth 65° 30', elevation 4° 30'), a site containing cupules and initially thought to serve as a horizon marker for the solstice, did not occur. The sun was observed rising just to the north of the predicted location (azimuth 62°, elevation 4°) and hence not on a true alignment.

Figure 5. CA-LAN-357.

Rock Art

Ethnographic evidence has revealed that Chumash religion can be described as celestial, revolving around:

> the esoteric and metaphorical worship of two celestial "bodies," earth and sun. The sun was perhaps regarded as supreme, a vivifying male force or entity that was also vaguely threatening, a possible bringer of death; the earth, on the other hand, was the generally maternal provider of food and other necessities of life, to be worshipped in her three aspects of wind, rain and fire [Blackburn 1974:104].

The sun (*Kakunupmawa*), moon and various other deities occupied the Upper World of the Chumash cosmos, with the sun paramount in this pantheon. Yet all were necessary for maintaining the integration and equilibrium of the universe as the Chumash perceived it (Blackburn 1975). The pursuance of a balanced life was reflected in daily activities, public ceremonies, and esoteric knowledge and power invoked by shamans. This power is undoubtedly reflected in certain motifs found in Chumash rock art.

Furthermore, the neighboring Gabrielino also appear to have had a religious complex involving the "convergence of such mythic and ceremonial elements as sun worship, highly developed mourning and solstitial rites, and elaborate eschatological beliefs" (Hudson and Blackburn 1978:246). In fact, it appears that the religion of the *yivar* (*Siliyik*), or *'antap* cult, was not strictly confined to the Chumash; it was also the custom of the Fernandeño Gabrielino, who occupied the San Fernando Valley (Harrington in Hudson and Underhay 1978:30). The West San Fernando Valley is a linguistic borderland between Chumash and Fernandeño, a distinct dialect of the Shoshonean speaking Gabrielino people. It is therefore likely that villages located on this boundary were actually biethnic. This is further supported by the appearance of both Chumash and

Gabrielino names in the mission records for the village of *Huwam,* which is located at the mouth of Bell Creek (C.D. King, personal communication 1980).

Based on the above evidence, the ceremonial activities occurring in this area were probably biethnic as well, and manifestations of both groups may be present in the rock art at Burro Flats, which is located on upper Bell Creek. There are too few examples of rock art that is unequivocally Gabrielino to provide evidence for contrasting rock art styles. Thus the Burro Flats pictograph panel may depict elements of symbolism and ritual from both groups, perhaps interrelated in one or more basic themes. It should be mentioned, however, that many Chumash stylistic elements occur in the Burro Flats panel, including attention to detail, bilateral symmetry, recurring symbols and particular painting techniques, such as use of dots, outlining, etc. (Lee 1977:299).

Although most pictograph panels remain enigmatic, recent ethnographic, archaeological and astronomical data have provided new insight into interpreting general concepts in rock art. It is more than likely that many characters portrayed in Chumash myth and narratives appear in their rock art. It is therefore important to consider and integrate data form the above disciplines, since information from all three sources in necessary for analyzing sites such as Burro Flats, where at least the main pictograph panel is in an excellent state of preservation.

Ethnographic data reveals that at least some rock art was painted during the winter solstice period (Blackburn 1975; Hudson and Underhay 1978:58). This information, considered along with certain archaeological data from Burro Flats (e.g., soapstone bowls and ornaments) (Curtis 1959: Appendix 5; Dirks, personal communication 1980), demonstrates a potential relationship to astronomically-based ceremonies and yields rather interesting results.

The dagger of light on the left-most set of concentric circles at the time of the winter solstice sunrise (Fig. 6) has stimulated additional questions regarding the general theme reflected in the pictograph panel. It is now felt that much of the symbolism in this panel involves depictions of mythological characters, events, or desired results of spiritual power evoked during the winter solstice or possibly at the time of the fall *Hutash* ceremony.

Perhaps the most significant characteristic of the panel is that it is framed by two sets of concentric circles, one located near each side of the panel, with a smaller set of concentric circles positioned lower and slightly off center. The overall visual effect is of symmetry and balance, qualities that form an integral part of the Chumash world view.

> For the Chumash, the great forces of nature are in a constant state of balanced opposition to one another, with none possessing an ultimate superiority that might irrevocably alter the proper condition of dynamic equilibrium that should normally prevail in the universe. ...Among the Chumash, the emphasis is...on balanced oppositions between contrasting forces, categories and states of being [Blackburn 1975:72-73].

All three sets of concentric circles share similar attributes, yet they can be contrasted. The two opposing sets that frame the panel are of equal diameter (25 x 28 cm ellipses), but do not contain the same number of rings. The one on the left contains five white rings, whereas the one on the right has six alternating red and white rings. The left and central concentric circle motifs are both framed by opposing figures with rake hands and feet that appear to be holding the outermost circle of each set. The smaller (central) set is surrounded by a circle of white dots.

Originally it was hypothesized that the winter solstice sunlight would touch all three sets of concentric circles as the day progressed. Yet only the far left motif was reached by sunlight, which rested on the second ring from the middle, then gradually progressed downward.

Figure 6.

Figure 7.

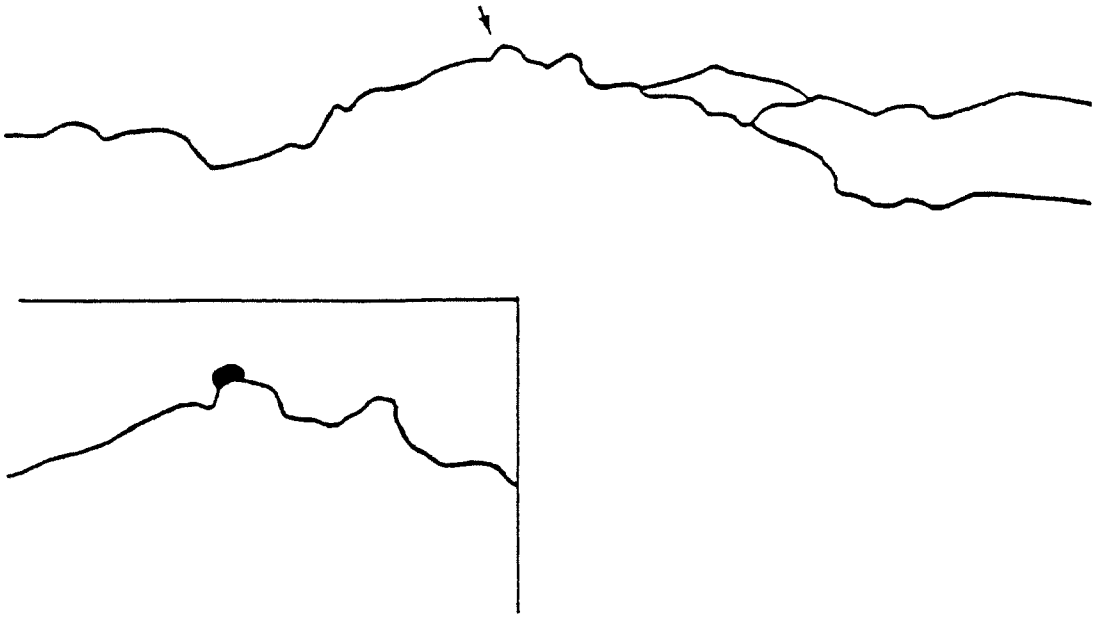


Figure 8. Winter Solstice Sunset on Stoney Point.

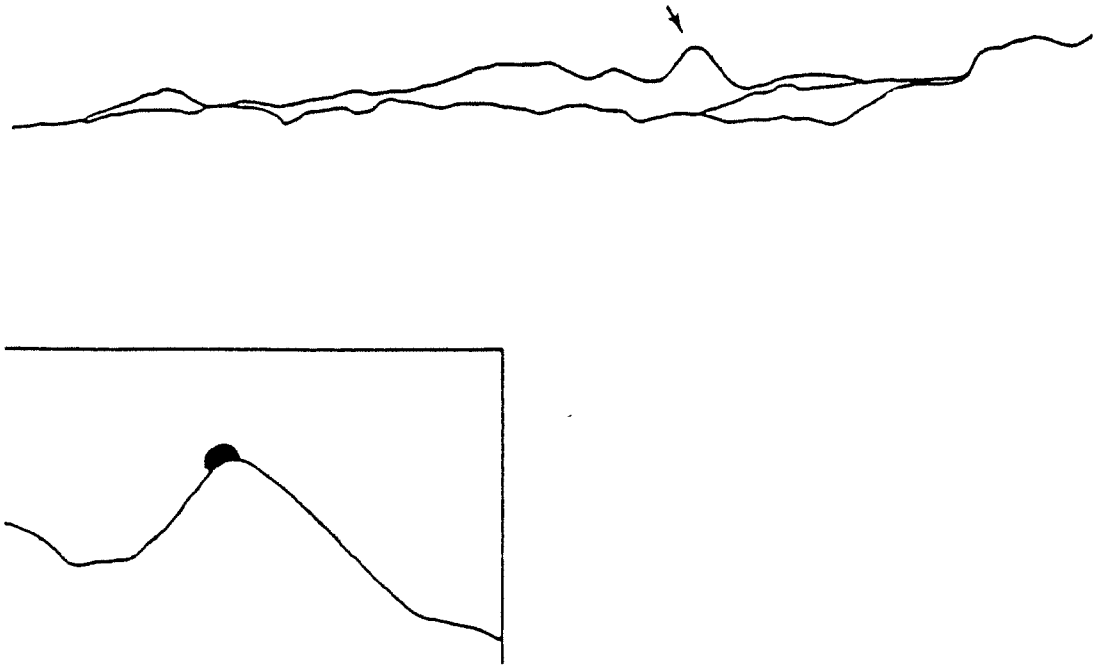


Figure 9. Summer Solstice Sunset on Prominent Unnamed Peak.

The concentric circle motif and light dagger effect may reflect the ritual efforts of the *'alchuklash* (astronomer-priest) to "pull back the sun" when it reached its southernmost extent at the time of the winter solstice (Hudson and Underhay 1978:62). The Chumash word *kakunup-mawa* refers to the rebirth of the sun (Hudson and Underhay 1978:51). The concentric circle motif has been placed deliberately to receive the first rays of the sun emanating from the east (Benson 1979:18). Thus the rock art may have functioned dynamically in a ritual celebrating the annual rebirth of the sun. This metaphorical rebirth of the sun may have signified that the balance of the universe was restored for another year (Hudson and Underhay 1978:62).

People with ritual knowledge could use their power to foresee the future and attempt to influence supernatural beings, who were considered neither purely good nor evil (Blackburn 1975:68). However, life was still uncertain because of the unpredictable responses of these beings (Blackburn 1975:69). Such uncertainty is present in the mythological peon game played annually at the time of the winter solstice by two opposing teams, Sun and *Slo'w* versus Sky Coyote and Morning Star (Blackburn 1975:31, 68, 72). Astronomer-priests used their power to predict the results of this game and to influence the outcome if they felt it would be detrimental to the inhabitants of the Middle World (Hudson and Underhay 1978:33).

Thus the two rake-hand figures positioned on opposite sides of the concentric circle motif may symbolize opposing forces of power. Sunlight falls on this motif from the east, which is the birthplace of the sun, then expands outward and downward from the third (middle) ring, eventually moving horizontally along the base of the panel. This may represent the successful rebirth of the sun and the more benevolent forces in nature.

However, on the west side of the concentric circle motif, opposite the light beam, a red centipede motif has been painted over one rake-hand figure. Centipedes are listed by John P. Harrington as one of the *Chinigchinich* avenger animals (i.e., they cause pain) (Hudson 1979:359). Since some of the avengers are associated with the cardinal directions, west may be the direction of centipede. Centipede may therefore symbolize a year of impoverishment for the inhabitants of the Middle World.

An alternate interpretation is that this motif may symbolize the sun. The two rake-hand figures could depict two shamans metaphorically holding the sun during the solstice (Hudson and Underhay 1978:71). If this shamanistic magic were successful, Sun would return on his path to the north.

As previously mentioned, the sun's light progresses down and then follows along a smooth, prepared surface just below the painted area, which extends to the easternmost part of the rock shelter. From photographs taken of this event, only a few motifs at the lower left are touched by the light. Most of the pictographs in the panel are just out of the sun's reach, as it moves along a burnished path at the base of the panel. Perhaps this area was intentionally smoothed to mirror the celestial pathway along which Sun journeys west toward his home in the sky. After reaching his westernmost limit, he then travels "around far to the south" (Blackburn 1975:93). Although no sun symbols appear in this panel that can be compared with those that appear on sunsticks (Hudson and Underhay 1978:93), both the light dagger effect and smoothed pathway may represent symbolic acts performed by this important deity, as would be expected during a solstitial event.

Chumash oral narratives and myths have been used for the interpretation of rock art by Lee (1977:2), Schupp-Wessel (1980), and others, with excellent results. We have borrowed the technique described by Schupp-Wessel (1980) in her interpretation of the famous pictograph panel at Painted Rock on the Carrizo Plain, using the characters and plots of particular Chumash myths in an attempt to unravel the skein of meaning that has been woven into the pictographs at Burro Flats.

Three pictographs near the right side of the main panel at Burro Flats (Fig. 3) seem to represent not only several interrelated themes, but also a Chumash myth (Blackburn 1975: Narrative 30). Briefly, this myth tells about a group of boys who spent their days trying to climb a pole.

Centipede was always the best climber. The boys were angered by this and complained to Coyote, who bewitched the pole and made it grow taller as Centipede climbed it. During his ascent, Centipede encountered strong winds and excessive heat before finally reaching the "door to the sky." When he went through this door into the Upper World, he was attacked by giant mosquitos and reduced to bare bones. Coyote felt remorse and went after Centipede to rescue and resurrect him. He found *Holhol* (condor) and convinced him to lend him his clothes and sticks to locate *Slo'w*, the eagle, so that he and Centipede could return to Middle World on the back of *Slo'w*. During the descent, the wing of *Slo'w* hit the pole, causing Coyote to fall to earth, where he was dashed to pieces. Centipede leapt to the pole and safely descended, then collected the bones of Coyote and rearticulated them, after which Coyote returned to life all by himself.

The elements in this portion of the rock art panel include: 1) a red centipede, 2) a red, black and white figure that appears to be part bird and part man, possibly representing *Slo'w*, the eagle, and/or Evening Star, and 3) a smaller red and black figure, also with human and bird-like attributes, which may represent *Holhol*, the condor, and/or Mars, but shown without his wings or sticks. The colors used for both "eagle" and "condor" are the same as those discussed by Hudson and Underhay (1978:96). The centipede is depicted on the eagle, as when in the myth he was returned to Middle World by *Slo'w*.

Located just to the left of the "eagle" and "condor" figures are two white, vertical, chain-like motifs that look like poles extending to the sky. Near the bottom of the pole motifs, and positioned between them, is a figure that may represent Coyote beginning to ascend the poles to the Upper World to rescue Centipede, who has been killed and only his bones left. Centipede may be represented near the top of the pole motifs, also between them, by the red outline of a centipede with a white interior.

Immediately below the centipede, and also between the two pole motifs, is a white figure with large rake feet. This figure may represent Coyote after he has borrowed the power-laden paraphernalia of *Holhol*, consisting of his clothes and "two beautiful, well made sticks." The red and white concentric circles to the right of the pole motifs may symbolize Centipede's ascent to the Upper World, passing through alternating elements of wind and heat (the white and red circles symbolizing wind and heat, respectively, and the solid center representing the "door to the sky"). The concentration of red and white dots to the right of the eagle may represent Coyote after he was dashed to pieces when he fell from *Slo'w* during the descent to Middle World.

Various symbolic themes can be extrapolated from the interrelationship of these pictograph motifs with the winter solstice ceremonies, possibly beginning with the fall *Hutash* activities. Some of the attributes and functions ascribed to Eagle and Condor, as discussed by Hudson and Underhay (1978:80-96), are listed below:

Eagle

1. Possibly "*Wot*-of-the-Land-of-the-Dead"
2. Identification with Venus as Evening Star
3. Character imitated in a ceremonial dance
4. Possible sacrificial victim prior to the winter solstice ceremony
5. Use of feathers to decorate poles during the winter solstice ceremony, and other paraphernalia
6. Possible contact with supernatural beings to foresee the future
7. Possible association with mourning ceremonies

Condor (who is not as well documented in the ethnographic record)

1. Clothes and sticks having supernatural powers that allow travel to great distances quickly, and ability to locate missing beings or objects

2. Identification with Mars (by color and "rapid-loop" movement in sky)
3. Character imitated in dance of *Holhol*
4. Possible sacrificial victim
5. Use of feathers to decorate poles used during winter solstice ceremonies, and other ritual paraphernalia
6. Possible contact or locator of supernatural beings such as *Slo'w*
7. Possible association with mourning ceremonies

Several of these attributes, or very similar ones, are also found among the Fernandeño.

Although *Slo'w*, the golden eagle, often ate people and is possibly "*Wot*-of-the-Land-of-the-Dead," he is also "*Wot*-who-knew-what-is-to-be," (Hudson and Underhay 1978:89). Thus, during the winter solstice, the ability of *Slo'w* to foretell the future would have been particularly important. The narrative seems to draw a more benevolent portrait of *Slo'w*, in that after several appeals he brought both Coyote and Centipede back to Middle World after Coyote resurrected Centipede from the dead. It might be that this portion of the pictograph panel was painted with the hope that the results of the annual peon game played in the shy during the winter solstice period might be favorably affected by appealing to the more benevolent side of *Slo'w*. This, particularly, may explain the presence of a centipede on the "eagle" motif, as this occurs in the myth.

A further connection with the winter solstice can be posited based on the red line-and-circle motif projecting upward from the left pole motif. This projection looks very similar to the drawing made of the feathered poles erected on New Year's Day on top of San Cayetaño Mountain (sic) for the winter solstice (Blackburn 1963:145). These poles are described as being wrapped with bunches of feather down, which could account for the unusual chain of half circles that make up both poles in the panel.

Furthermore, Hudson and Underhay (1978) have suggested the use of Condor's power in locating *Slo'w* for anniversary mourning ceremonies when Venus as Evening Star is invisible during three-year intervals, which seems to coincide with the timing of these ceremonies. The circular motifs located just above each of the two pole motifs may represent comets. They could therefore symbolize death by portraying souls en route to *Shimilaqsha*, the Land-of-the-Dead (Lee 1977:9-10). The two bird-like figures (eagle and condor) depicted with human qualities may be shamans in dance paraphernalia impersonating and communicating the power of these two deities, symbolizing the integration of belief and action. Thus, the portrayal of all these elements suggests the significance of myth, shamanistic power, and ceremonies such as the Mourning and Winter Solstice ceremonies.

The portrayal of this myth in rock art may also involve initiation rites for certain shamans who have acquired the power to travel to the Upper World to communicate with sky deities. The theme and representation of this myth are well summarized by Blackburn (1975:88):

> The initiatory "death" at the hands of the older shaman, the ascent of a pole to the sky world (an ordeal involving conflicts with supernatural beings and the reduction of the initiate to bare bones), and the initiate's rescue by his sponsor, their ultimate return to earth, and the new shaman's resurrection of the sponsor—all of these elements in "Coyote and Centipede" are standard and virtually universal shamanistic themes.... It is also clear from a comparison of narratives in different sections of the collection that the various magical devices utilized by protagonists were an essential feature of actual shamanistic practice. There is abundant ethnographic confirmation for the shamanistic use of such items as the down-covered string..., the flute..., the charmstone..., drugs..., and *'atiswin*..., while revival of the dead... and ability to travel great distances rapidly...are again characteristics universally attributed to shamans. Finally, it might be mentioned in passing that pole-climbing

was an integral element of many of the rituals associated with the Kuksu cults of central California...and was also a part of the Luiseño Notush ceremony....

Conti (personal communication 1980) was the first to recognize the delicate flower-like motifs that appear throughout the Burro Flats pictograph panel are paintings of human hands, depicted smaller than a child's hand. She has suggested that this handprint motif may be associated with rites of initiation into the *'antap* cult of the Chumash. All the handprints are clustered in three areas of the panel: (1) below and near the concentric circle motif that catches the winter solstice sunrise "light dagger," (2) on and around the similar concentric circle motif near the center of the panel, and (3) on and between the vertical-pole motifs discussed above.

The elements presented in the myth suggest that these pole motifs might be connected with initiation rites of shamans. The Coyote and Centipede myth clearly duplicates the rites connected with shaman initiation rites described in the above quotation. If this part of the panel does depict the myth of Coyote and Centipede, then it may also be regarded as a metaphorical depiction of the initiation of a shaman, which is nothing more than a reenactment of a mythical event.

One puzzling aspect of this part of the panel is that each of these pole motifs is connected with a circular motif on the ceiling that can only be described as a depiction of a celestial object. Hudson and Underhay (1978:99) have suggested that these two circular motifs may depict comets, or one comet as it approaches and leaves the sun. If these pole-like motifs are indeed depictions of ceremonial poles, what are they doing connected to comets?

This question leads to an entirely different interpretation—favored by one author of this paper, and suggested by Bob Edberg (1985)—that these two pole-like motifs represent the *Ko-too-mut* poles used by the Gabrielino and Luiseño during their mourning ceremonies, and later erected over the graves of their dead chiefs. The *Ko-too-mut* pole represented the spirit of the dead man, and was 20 to 50 feet tall. It was painted white on top, then red, black, and gray, each color representing a different part of the body. Placed down the length of the pole were many inverted baskets whose centers had been cut out for mounting on the pole (Merriam 1955:78). This is a very accurate description of the pole-like motifs in the pictograph panel at Burro Flats.

Fr. Boscana (1978:89) wrote that the Luiseño Indians, after seeing a comet in the skies from September until November 1825, consulted together and came to the conclusion that its appearance "denoted some important change in their destiny." Some thought that the comet was Sirout, the father of their grand captain, Ouiot; others believed it was "Tacu, the father of Ouiamot or Chinigchinich." Still others believed that it was an omen of better times.

Since mourning ceremonies were usually held only every three years, it is not likely that a painting of a *Ko-too-mut* pole was intended to evoke magic to assist the dead chief on his way to the other world, but it could have been intended to assist the shaman in a metaphorical flight into the Upper World to communicate with the spirit of a dead chief in order to predict future events. Comets and meteors were associated with omens and predictions, and one of the duties of the shamans at the time of the winter solstice was to make predictions about the upcoming year. The function of these two pole-like motifs, then, may have been to evoke magic that would assist the shaman in making these predictions.

An important consideration for dealing with specific interpretations of rock art which is not easily transcended directly relates to world view. Supernatural beings are attributed with the entire gamut of human characteristics, and are seen as the causative agents of natural phenomena. In this sense, they are neither wholly good nor evil, as these are not considered mutually exclusive categories (Blackburn 1975:66-68). Each supernatural being "has the potential for being both simultaneously, although one end of the continuum may predominate" (Blackburn 1975:68). Therefore, Sun can be malevolent (bring death if he wins the peon game), as well as benevolent (his "rebirth" and presence sustains life). These concepts are a reflection of the uncertainties found in the natural environment in which only certain limits of control can be exercised through the use of knowledge. Furthermore, as Blackburn (1975:86) has suggested, many myths about the

supernatural beings may be integrally tied into "allegorical expressions of shamanistic concepts and experiences."

Thus it can be postulated on the basis of the myths, the rock art panel, and the archaeoastronomical data that this pictograph panel represents important belief and activities that relate to shamanism and winter solstice ceremonies.

Interpretations

Our studies at Burro Flats and CA-LAN-357 have raised a number of new questions and suggested future areas of research relating to astronomy and ceremonialism as practiced in the West San Fernando Valley. First, there are at least two unexplained similarities between the two sites. Each site complex has a number of discrete cupule concentrations. The function of cupules has long baffled archaeologists, but there is evidence that in at least some cases, such as the "baby rocks" and "rain rocks" of northern California, they were used in a ritual context. It has also been suggested that in certain instances cupule patterns may have astronomical significance (Lee and Horne 1978:223; Romani et al. 1978).

The second similarity is the presence of isolated bedrock mortars that form direct-observation solstice alignments with conspicuous geographic features. In the Rio Grande area, Southwestern Pueblo sun-watchers were known to have scattered corn meal offerings near observation points around the time of the summer solstice before they monitored the sun's position on the horizon (Ellis 1975:82). Similarly, astronomer-priests may have prepared or given their offerings in bedrock mortars at exact points of solstice observation at Burro Flats and CA-LAN-357.

Direct observation of solstice alignments from bedrock mortars at Burro Flats and CA-LAN-357 may provide evidence for fixed-point monitoring stations. This is particularly true for the CA-LAN-357 complex. Although both the winter and summer solstice sunset alignments hold in a general way from any point on the sandstone outcrop, it is believed that the isolated mortar location represents one of the most accurate monitoring positions. This is because in both instances an edge of the sun goes down in line with the edge of a prominent geographical feature. This type of edge-to-edge alignment makes it easier to detect the sun's movement, particularly with the extreme glare during sunset.

There is evidence at Burro Flats and CA-LAN-357 that the isolated bedrock mortars were intentionally positioned. At Burro Flats, the location of the isolated mortar (Fig. 4a) is the only spot in this area where a mortar could align with the center of the notch at the time of a solstice. Although another section of exposed bedrock nearby contains five mortars (Fig. 4b), none of these mortars directly aligns with any conspicuous feature on the horizon. Furthermore, the bedrock mortar on top of the sandstone shelter that houses the pictograph panel at CA-LAN-357 is located somewhat off to the side, in an inconvenient spot, when a large level area in the center is ideally suited for mortars.

In addition to functioning as fixed viewing points for direct solstice monitoring, bedrock mortars may also have served in other ritual contexts. The "bear paw" configuration at Burro Flats (Fig. 4b) seems to illustrate this possibility. The close spacing of the mortars plus the graduated sizes of the four peripheral mortars, as well as the overall paw-like configuration, suggests that communal processing of acorns was not likely in this particular spot.

During the summer solstice sunrise, a shadow is cast across several of the mortars (Fig. 7). This may be coincidental, as no similar shadow alignments have yet been observed elsewhere on the site during solstice or equinox sunrises or sunsets, although different mortars may have held a *gnomon* or sunstick to cast designed shadows at sunrise or sunset during solstice or equinox. It is possible that offerings were made in the mortars in a specific sequence associated with ceremonial events.

It is also possible that the mortars actually represent the toes and heel of a bear. Although bear paws actually have five toes, several of the famous Chumash "bear-track" petroglyphs in the Cuyama region are depicted with from four to six toes (Grant 1965:88; Figure 81). The paw-like configuration at Burro Flats is generally, but not precisely, aligned with the summer solstice sunrise. Hudson and Underhay (1978:136) have suggested that the belt stars of Orion constitute the Chumash bear constellation, a possible marker for the months of July and August. This would place the sun quite near Orion's belt during late June and early July, and might account for the alignment not coinciding directly with the summer solstice sunrise. It is also possible that the paw-like configuration is aligned with the first appearance of Orion's belt as these three stars rise before dawn during the summer solstice period or shortly thereafter. The following ethnographic account by Fernando Librado *Kitsepawit* (Hudson and Underhay 1978:14) describes a ceremony that could have been associated with the latter event:

> As the sun rose above the eastern horizon the Chumash Bear Dancer pointed his hand-held staff at it, and sang:
>
> > Darkness goes blind like a blind man.
> > Then light bumps into it, and
> > Light will last forever.

Thus, bedrock mortars may play a very important role at sites with potential astronomical significance. In some cases they could represent archaeological evidence for fixed monitoring points for direct observation of solar alignments. In other cases, such as the "bear paw" design at Burro Flats, the mortars might provide archaeological evidence of fixed monitoring points for direct observation of stellar alignments, although this has not been tested in any known case.

There is an interesting difference between the two site complexes. Only sunrise alignments have been observed at Burro Flats (both winter and summer solstice events), whereas only sunset alignments (again both summer and winter solstice events) have been observed at the CA-LAN-357 site complex, which is located 11.9 km to the northeast. The location of the former Medea Creek Village (now covered by a shopping center) near Agoura, California, was recently monitored for solsticial alignments. Conspicuous horizon markers were noted for both winter and summer sunrises. This may reflect a pattern whereby only sunrises were observed at some sites and only sunsets were observed at others. If this pattern does evolve, it may have something to do with Chumash social organization.

The precision of the recently observed alignments is still a matter of interpretation. To date, only the summer solstice sunrise alignment at Burro Flats has been monitored; this was for the period of one week after the day of the actual solstice. In this case, the sun appears to begin moving on the seventh day after the solstice. This falls well within the 10-day range Hedges found for his indirect solstice observation of the pictograph at La Rumorosa, in Baja California (Hudson et al. 1979:51). If the alignment at Burro Flats holds for an equal number of days after the solstice, then it could be expected to begin seven days before the solstice, for a total of 14 days. Although this does not seem to be a very accurate measurement, one ethnographic account relates that the New Year was not proclaimed until the sun appeared to stand still for three or four days (Hudson et al. 1979:47; Blackburn 1963:141; Outland 1956:2).

Thus, if the calculations for Burro Flats are correct and the sun begins its standstill there seven days before the actual solstice, then based on ethnographic evidence alone it should be off by only three or four days. Furthermore, at the summer solstice observation locus at Burro Flats, an imaginary line can be drawn from the isolated mortar in the (Fig. 4a) through a shallow mortar (D) to the natural notch in the cliff (E). A *gnomon* placed upright in the mortar (D) might further increase the accuracy of the alignment.

The Burro Flats winter solstice sunrise light dagger effect is certainly one of our most spectacular findings. That this alignment is not simply a coincidence, but has astronomical signifi-

cance, is strengthened by the fact that in at least two other cases, one at La Rumorosa, Baja California (Hudson et al. 1979:51), and at Fajada Butte, New Mexico (Frazier 1979:56-57), astronomical alignments involving light daggers have been demonstrated. We do not know how precise the Burro Flats winter solstice alignment is, but feel that it lasts only a few days because of the extreme southerly angle of the top of the natural archway. We know that no sunlight touches or even comes near the concentric circle motif during the equinoxes or the summer solstice.

Moreover, the concentric circle motif may have served as an incremental gauge of the sun's movement during the days the dagger effect occurred. For instance, the point of the dagger rested on the middle ring of the motif at sunrise on the winter solstice. As its position changed in a number of days, that may well have served to indicate the passing of the solstice. It has also been suggested that at the time of the major standstill of the moon, the full moon may cast a shadow that would penetrate to the center of this concentric circle motif (Seymour and Edberg 1979:67). At this time, the moon is 5° farther south than the ecliptic (Krupp 1978:19).

Background studies in Chumash ceremonialism have led to the examination of burial orientations. A number of explanations have been offered for different burial alignments within the same cemetery. L. B. King (1969:36) has suggested that burial orientations may be related in some fashion to the rising or setting sun. In addition, she notes the possibility that at least some burials are aligned with certain geographical places such as Point Conception, the entrance to the Chumash "Land-of-the-Dead," Furthermore, Schulz (1970) feels that the orientation of the bodies may indicate season of death.

Toren (1979) has suggested that the differences in burial orientation may correspond to celestial objects associated with individuals during life. Their immediate families and possibly other relatives could also be buried on the same alignment. It might also be that burials were always aligned with the particular seasonal position of the Milky Way at the time of interment, as the Milky Way represents the road to the Chumash "Land-of-the-Dead" during the time of the winter solstice.

Theoretical Implications

The field of archaeoastronomy has been criticized for its lack of problem-oriented research (Reyman 1975:205). This is a valid criticism. We have taken the hint offered by Blackburn (1974:110) that:

> ...if, as Binford has suggested, the locus of cultural process lies in the dynamic articulation of subsystems, then ceremonialism may be either an important regulatory mechanism or an important source of cultural change.

Recent studies of California Indian ceremonialism, developed from functional-ecological approaches, have stressed the "resource equalizing" effects of ritual (Vayda 1967; Bettinger and King 1971; Bean 1972). Like Blackburn (1974:109-110), we believe that religion and ceremonialism can also be important factors in cultural change. In fact, astronomically-based ceremonialism may have played the dominant role in the highly stratified, and socially and technologically complex culture the Spanish first encountered in A.D. 1542.

The theoretical framework best suited to this sort of interpretation is the type of Marxist analysis developed primarily by Maurice Godelier (1977, 1978). Contrary to the more traditional Marxists, Godelier (1978) forcefully argues that such things as kinship, politics, or religion can provide the dominant motivational factor guiding the way people think and act. Thus, using Godelier's Marxism, we are no longer restricted to economic causes.

Briefly, our central thesis is that an astronomically-based yearly cycle of ceremonial gatherings is not strictly bound to local environmental fluctuations. In fact, every year, whether the harvest was good or not, the ceremonies had to take place to maintain the balance of the universe.

Large ceremonial gatherings involved large-scale food consumption, the payment of performers, and offerings of shell beads and food to various "Sky People" (e.g., to Sun during the winter solstice festival). These occasions also provided the best opportunity for trade.

The demands of the annual ritual cycle created the need for intensification of food gathering and storage. Because of the increased trading opportunities, various craft specialists produced more goods, and this quite possibly led to the development of craft guilds or brotherhoods. Blackburn (1974) has expressed similar ideas. In addition, we believe these regularly held, astronomically-based ceremonies intensified Channel Island interaction with the coastal mainland.

This in turn made the ocean-going vessel, or *tomol*, indispensable, as the islands possessed many of the means of production (e.g., shell beads, projectile points, stone bowls). Furthermore, political and social ties evolved from this increased interaction. The *tomol* became more important as the need arose for increased amounts of storable foods for the ceremonies. Large quantities of fish, a storable resource, could be caught with a *tomol* in a short time. Thus we feel the central significance of island and coastal mainland interaction caused by this ceremonialism led to the prominent position of the *tomol* owners and probably to a lesser extent to all the members of the Brotherhood-of-the-*Tomol* (such as *tomol* makers, fishermen, bailers, etc.).

Finally, a Marxist framework seems to explain why the general populace would consent to an intensification of production that appeared to reach a level that superceded their everyday needs. Godelier (1978:767) hypothesizes that such consent was often gained by social relations that appeared as an "exchange of services" to the general populace. Godelier (1978:9-10) explains:

> We can therefore understand why, when circumstances permitted, certain men, certain groups came to personify the common good themselves or to gain exclusive access to supernatural powers which were supposed to control the conditions for the reproduction of the universe and society. Such men or groups have appeared to be above the common run of mortals, near to gods; they have narrowed the distance, which from the beginning of time, has separated man from the gods. Taken from this point of view, it becomes clear how, in many societies where there are hereditary chiefs who use no physical violence over their dependents—such as the Trobriand Islanders, studied by Malinowski—the form which the chief's power takes and the ideological justification for such power comes from the fact that they control first and foremost the great fertility rites of the Land and Sea and that they appear to be the necessary intermediaries between clans, ancestors and gods. To stand apart from men and dominate them, to approach the gods and command obedience, are perhaps only two simultaneous aspects of the same process—a road and direction leading to class societies and the state. On this road stand the great figures of Assur, god-king of his society, and the Inca Shinti, son of the Sun, who ruled over Tahuantinsuyu, "the empire of the four quarters."

Among the Chumash, the *'antap* cult, consisting of the *'alchuklash* (astronomer-priest) and other religious and ceremonial functionaries, provided the service of maintaining the balance of the universe (Hudson and Underhay 1978:27-43). These religious functionaries made themselves indispensable by restricting all ritual behavior, as well as the sacred language of the *siliyik*, to only "initiated" members of the cult. Therefore, only cult members could communicate with the supernatural and the First People of the sky.

Blackburn (1974:110) has noted:

> Ceremonialism touched upon almost every aspect of life in California because it was in the context of ritual that the various ecological and social subsystems articulated....

If this is true, any models we develop to explain cultural complexity in the area should accord a dominant position to ceremonialism. Furthermore, it appears that Chumash ceremonialism was astronomically-based (Hudson and Underhay 1978). Thus, through our studies in the West San Fernando Valley, we are not only attempting to document and measure astronomical alignments, but also to discover the internal ritual organization of the Malibu politico-religious province. by these means we hope to reveal the structure of Chumash ceremonialism in our study area.

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