

# ARCHAEOASTRONOMICAL OBSERVATIONS IN WESTWATER CANYON, UTAH

by

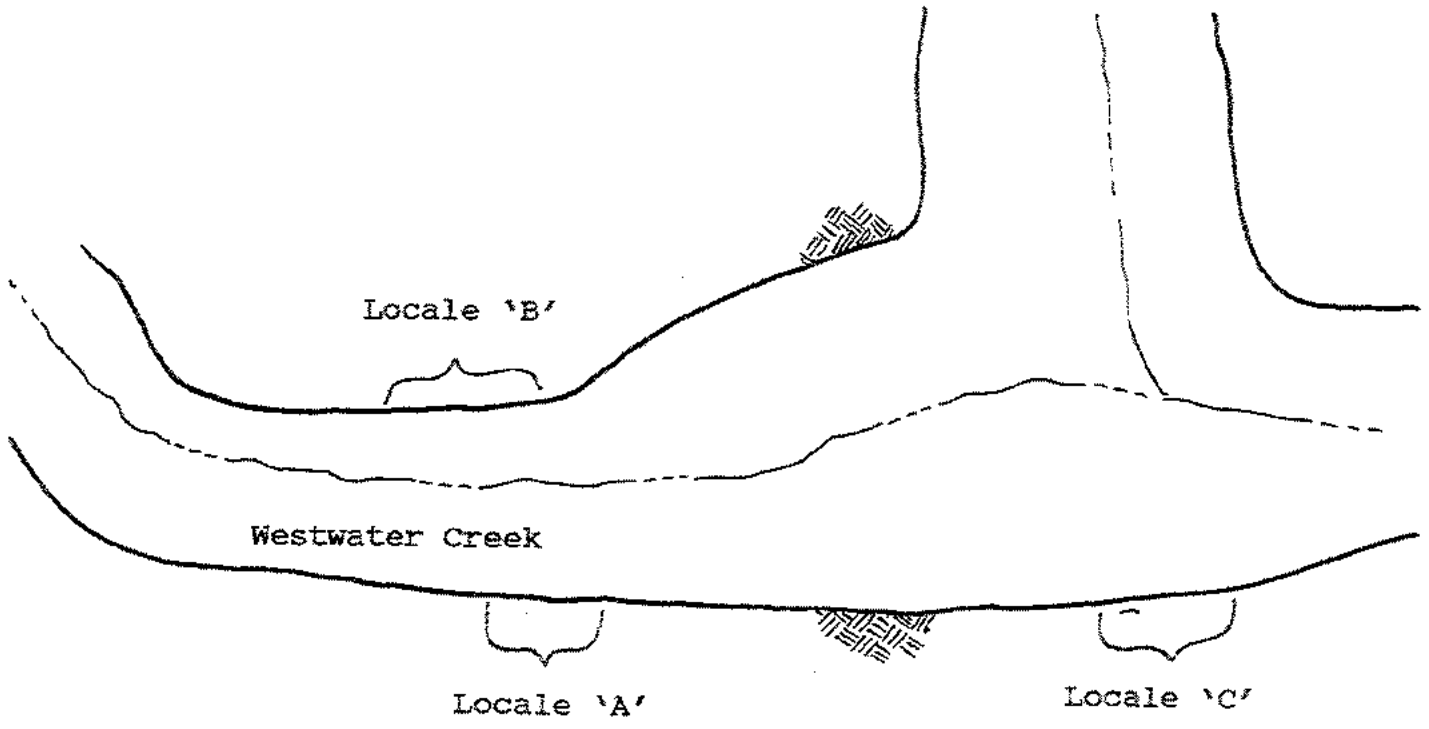
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## INTRODUCTION

Westwater Canyon lies at the extreme eastern edge of the Utah section of the Book Cliffs, see Figure 1. The rock art sites discussed here are located in the transition zone between the juniper/pinyon forests of the Book Cliffs and the sagebrush and saltbush flatlands to the south. The sites that are included in this paper are at the junction of Westwater and another main canyon. The panels discussed below are clustered at three locations in Westwater Canyon. Two panel locales face roughly north, and one panel locale faces roughly south, see Figure 1. The rock art locales are labeled A, B, and C.

The sites are not known to the general public. They have not been advertised, nor have they been developed or protected. This is principally because the sites are all on private land. Should you desire to visit these sites please note that permission must be obtained from the land owner before going to any of the panels. Aiding the sites' preservation is the lack of their location being marked on Utah highway maps, as has been done with the Segoe Canyon site farther west. While unknown to the public, the sites' have received some vandalism. This vandalism has occurred because of the sites proximity to main dirt roads. The land owner is well aware of this and discourages publicity about the sites. Some people interested in early history are aware of the rock art in this location because of the presence of an early french trapper's signature. Antoine Robidoux carved his name above and over an apparent, Fremont or Ute, shield-like figure. Rock art enthusiasts are well aware of the site, principally because they have been described by Castleton (1978:173-177).

The observations being conducted at Westwater Canyon are part of a series of hypotheses for meaning of rock art images that are being tested at rock art sites through out Utah and adjoining states. In addition to hypothesis testing, one of the major purposes of this research project is to determine the extent, both culturally and areally (therefore temporally), of specific meanings and functions of specific images. The principal images of interest are concentric circles. Nevertheless, many solar interactions have been



Sketch map showing relative positions of panels in Westwater Canyon.

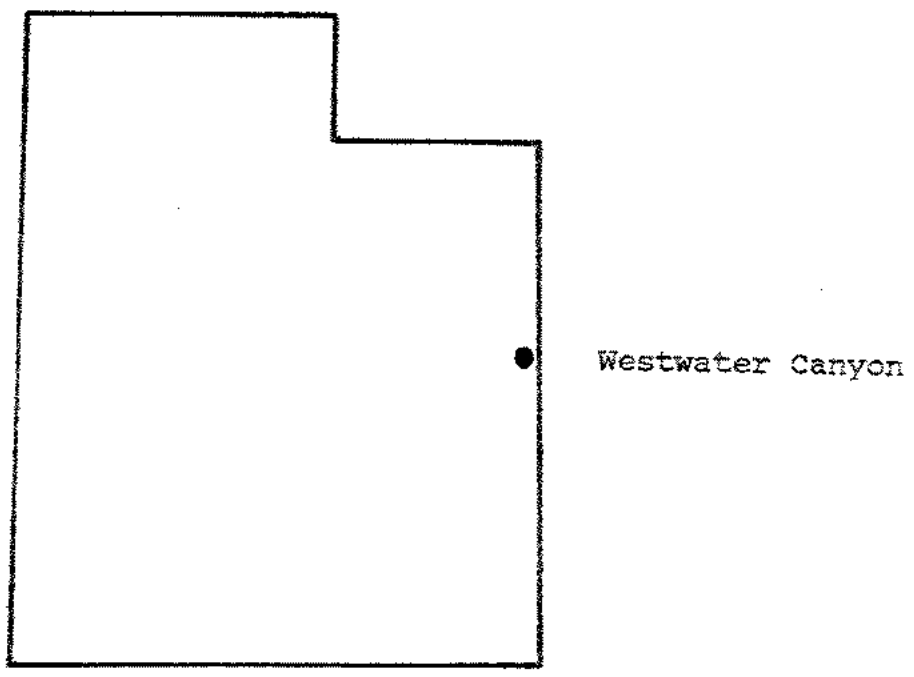


Figure 1.

observed. These observations include both shadow interactions and horizontal positions of the rising and setting sun. Over 140 slides of interactions were shown in the symposium presentation. All of the interactions discussed here were shown at the symposium. There are however some minor observations that were presented at the symposium that are omitted from this paper.

Observations of the interactions of the panels with the sun were begun at winter solstice in 1989. The evening preceding winter solstice was spent somewhat uncomfortably. My jeep became stuck in the ice and water of Westwater Creek while attempting to cross it long after dark. As a result the next morning I was forced to walk about a mile to the site before sunrise. It was not until some hours later that an oil field worker stopped by to pull me out. During the night the creek had frozen two or three inches deep around the wheels of the jeep, and the ice had to be broken away with a hammer. I mention these difficulties should anyone attempt observations at winter solstice in the Book Cliffs.

#### PANEL ONE

The first panel observed was in area "A". It is called 'panel one' for convenience. The panel is just below the Robidoux inscription - see Figure 2. It is a 'Fremont Shield Figure'. It consists of a large red circle outlined with two closely spaced white concentric circles. On the top of the concentric circle there is a vertical projection ending in a larger somewhat rounded area. This gives the impression that the image represents a person standing behind a shield. There are several well defined shield figures in nearby panels so this interpretation is not unreasonable. At the bottom of the shield figure there is a broken ledge, therefore if there were any legs painted below the shield it is impossible to ascertain. In the center of the red area there is a white painted round area with two distinct white painted inward curving horns on the top. There are also a few white lines, which look like fringe, attached at various places around the white circle. To the left of the apparent shield figure there is a white painted circle. Above this circle there is what appears to be a red painted footprint. Below the circle there are at least four white painted small circles placed in a vertical row. Also in the panel are two red painted circles. Each circle has a dot in the center. One is placed above and to the right of the shield figure, and the other is placed a little to the right of the head. Some portions of the image are indistinct because of weathering, and because someone has shot a gun at the panel, making about 50 bullet holes in and around the shield figure.

The first sunlight on the panel at winter solstice occurred just after sunrise when the sun rose behind a group of jagged



Figure 2. Robidoux panel. Photograph from Utah State Historical Society files. Note the absence of the small red circles.

boulders a few meters to the northeast of the panel. The boulders are very large and appear, because of weathering and lichen growth, to have been in their relative position for a long time. Any shadows, therefore, cast by them appear to have been present at least for several hundred years. The boulder cast a diffuse horizontal shadow completely across the panel. As the sun rose in the sky the shadow cast by the boulder remained horizontal as it passed from the top of the shield figure to near the bottom. When viewed from the panel, the sun rose above the flat horizontal portion of the boulder as it cast the horizontal shadow over the figure. The sun then traveled to the top of a pointed projection. It is possible that the shield figure was placed at this location to observe this interaction, or to have the shadows play across the image in this manner, but firm conclusions are not apparent.

The panel was next observed at equinox sunrise. At this time of the year the sun had shifted to the east, and the sun rose directly behind a large boulder. At the exact moment of sunrise the boulder cast a shadow entirely over the panel. As the sun rose, a notch (about 120 degrees) in the side of the boulder passed above the small red circle with a dot, see Figure 3. As the shadow passed through the head of the figure, the sun appeared on the shoulder of the boulder when viewed from the panel. As the shadow progressed down and across the shield figure, the notch became more diffuse and broken and passed just below the second red circle with a dot in the center, see Figure 4. The notch also passed just over the head of the shield figure.

The placement of the small red circles nearly coincides with the shadow cast by the notch on the large boulder. Since both circles do not line up with the notch, they do not appear to have been intentionally placed to interact with the shadow, or to mark equinox. However, there is a possibility that the upper left circle could mark a date a day or two before equinox, and the other circle could mark a day or two after equinox. This would have to be determined.

The panel was next observed at summer solstice sunrise. The sun had now moved to its extreme northeast position. The sun rose far to the left of the panel, and to the left of the large boulders. At the moment of sunrise the panel was immediately bathed in sunlight. It was much later in the day before any definite shadows crossed the panel. The position of the sun on the horizon at sunrise was just to the left of a low point on the horizon. As the shadow moved down the panel a notch was formed, the center of which just touched the outside edge of the upper most small red circle with the dot in the center at the same time it went through the outside edge of the other small red circle with the dot, see Figure 5. This interaction suggests a possible intentional placement. The shadow then traveled down through the panel,

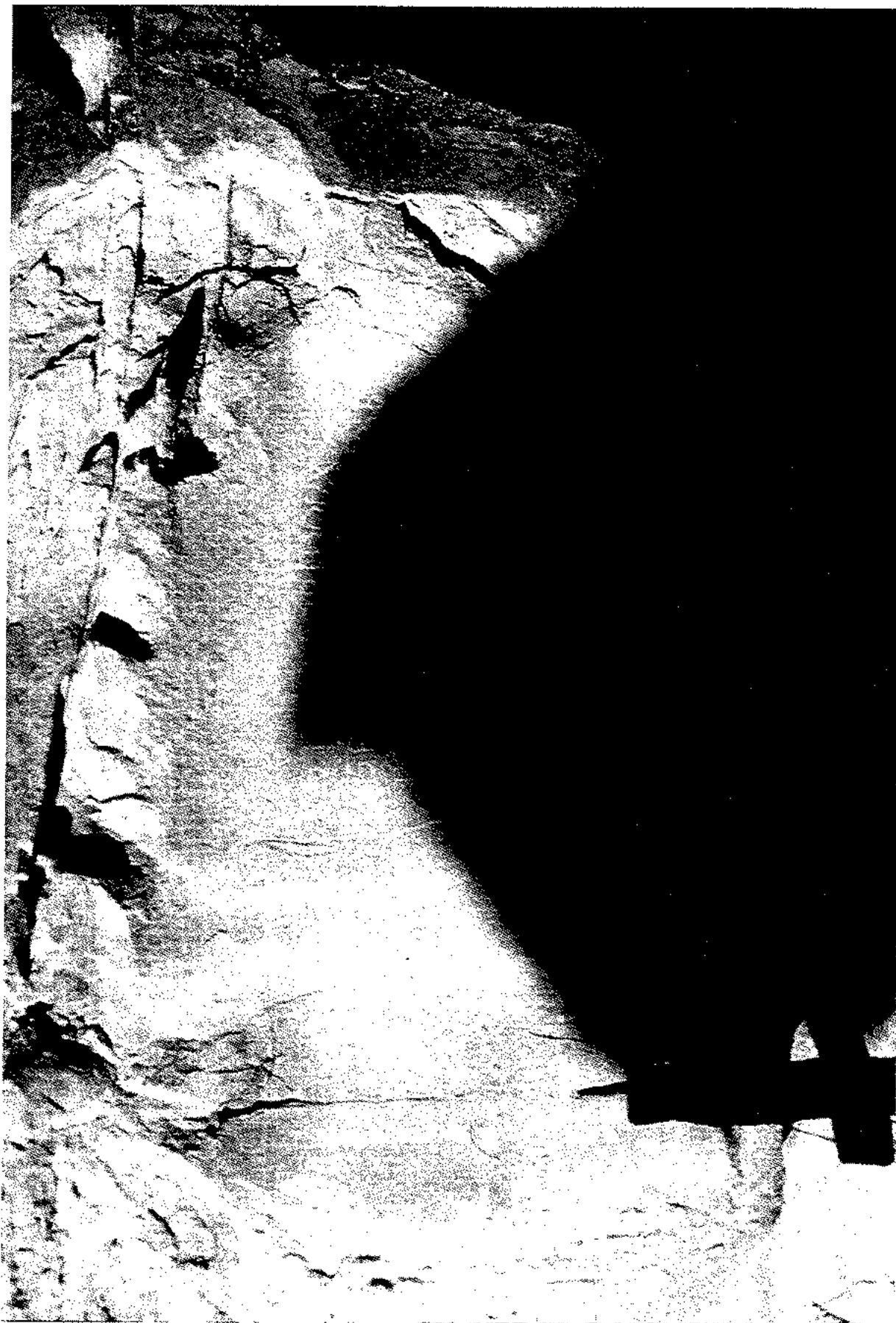


Figure 3. Interaction of the shadow cast by a large boulder at equinox with the first of two small red painted circles with a dot in the center.



Figure 4. Interaction of the shadow cast by a large boulder at equinox with the second of two small red painted circles with a dot in the center.



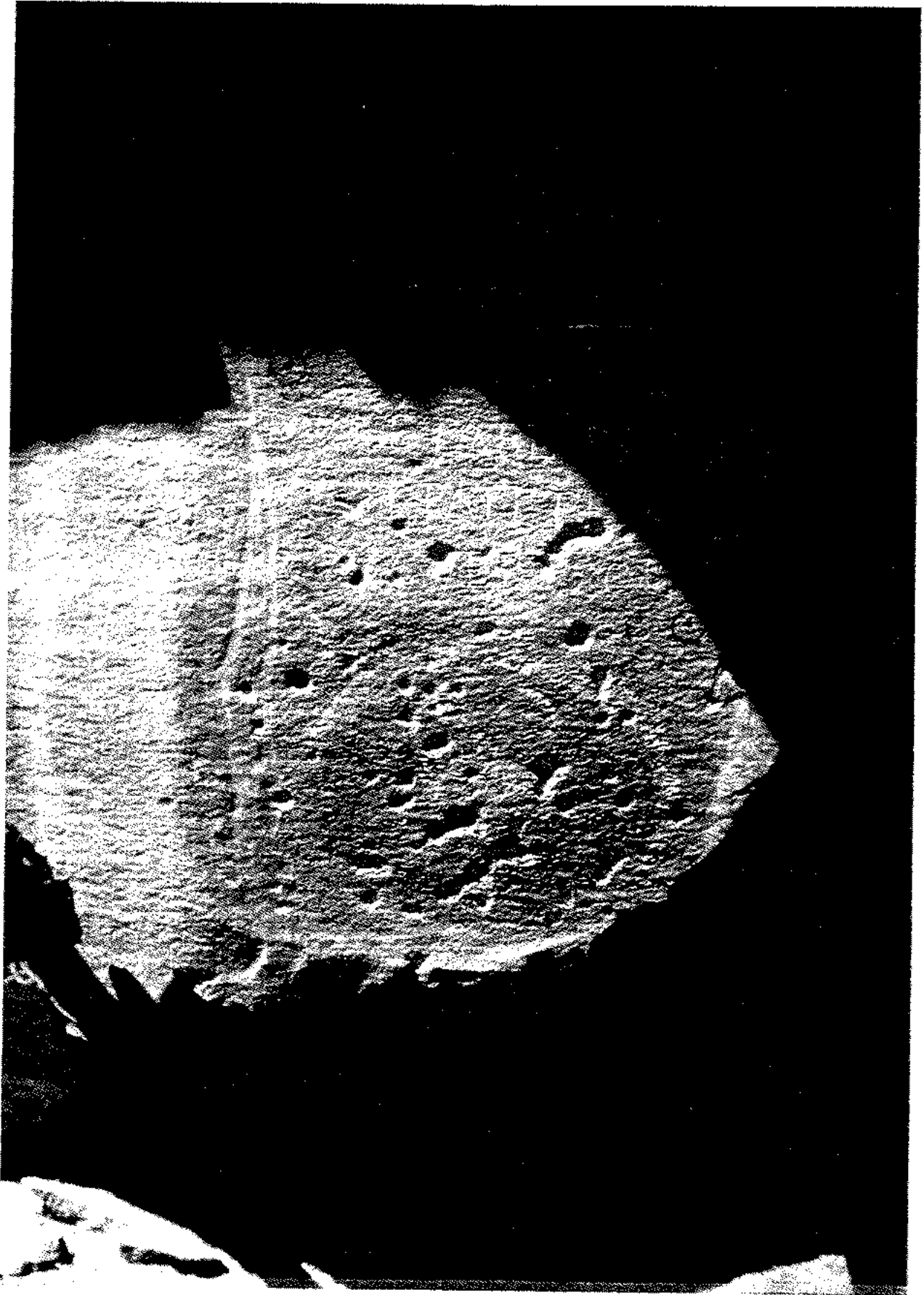


Figure 5. Interaction of the shadow cast by a large boulder at summer solstice with the two small red painted circles with a dot in the center.



with no further alignments occurring as the sun moved down to set behind the cliff.

It was not until later that I discovered that the small red painted circles were not present in the panel several years ago. A photograph from the Utah State Historical Society's files was on display at the State Historical Society when I happened to walk by it. I noticed that the small red circles were not present in the photograph. The photograph is shown in figure 2. The absence of the circles indicates that someone placed the images in the panel within the last seventy-five years. One of the painted circles is even placed over one of the bullet holes. If the interactions of the sun with these images as described here, or others not yet observed, are indicative of intent, then perhaps historic Native Americans were using symbols to mark specific times of the year. On the other hand these alignments may be just a coincidence. Only if other images are found that interact similarly will intent be substantiated. A detailed examination and analysis of the pigment used to create these red circles would be informative.

#### PANEL TWO

To the right of panel one in a north facing alcove there is a similar shield image along with other figures. This is designated panel two. The body of the shield figure is composed of three, equally spaced, white concentric circles. The center circle is filled in with red pigment. A head is present on top of the shield figure. It is composed of a white circle with seven vertical red lines placed on top of it, apparently as a headdress. In the body of the shield figure, on the left side, there are five red painted lines, and on the right side there is a red painted area.

This panel was observed at winter solstice, equinox, and summer solstice sunrises. It was not until summer solstice 1990 that sunlight entered into the alcove near the panel. At that time the sun is at its extreme northeasterly position. Because the roof of the alcove overhangs the panel, the only time during the day that the sun could shine near the panel was at the exact moment of sunrise. At that time sunlight highlighted a small, rough projection just to the left of the shield figure. This created an irregular patch of sunlight, see Figure 6. Sunlight just touched one edge of the image on a small, natural rough projection of sandstone. As the sun rose, the highlight quickly disappeared.

Perhaps equally as interesting and important is the position of the sun on the horizon at sunrise, see Figure 7. When viewed from the concentric circle/shield figure, the sun rises momentarily in a sharp angle formed by the horizon and



Figure 6. Highlighting of a rough projection of rock by the sun at the moment of sunrise at summer solstice.



Figure 7. The position of the sun on the horizon at the moment of sunrise at summer solstice, when viewed from the concentric circle shield figure.

cliff face

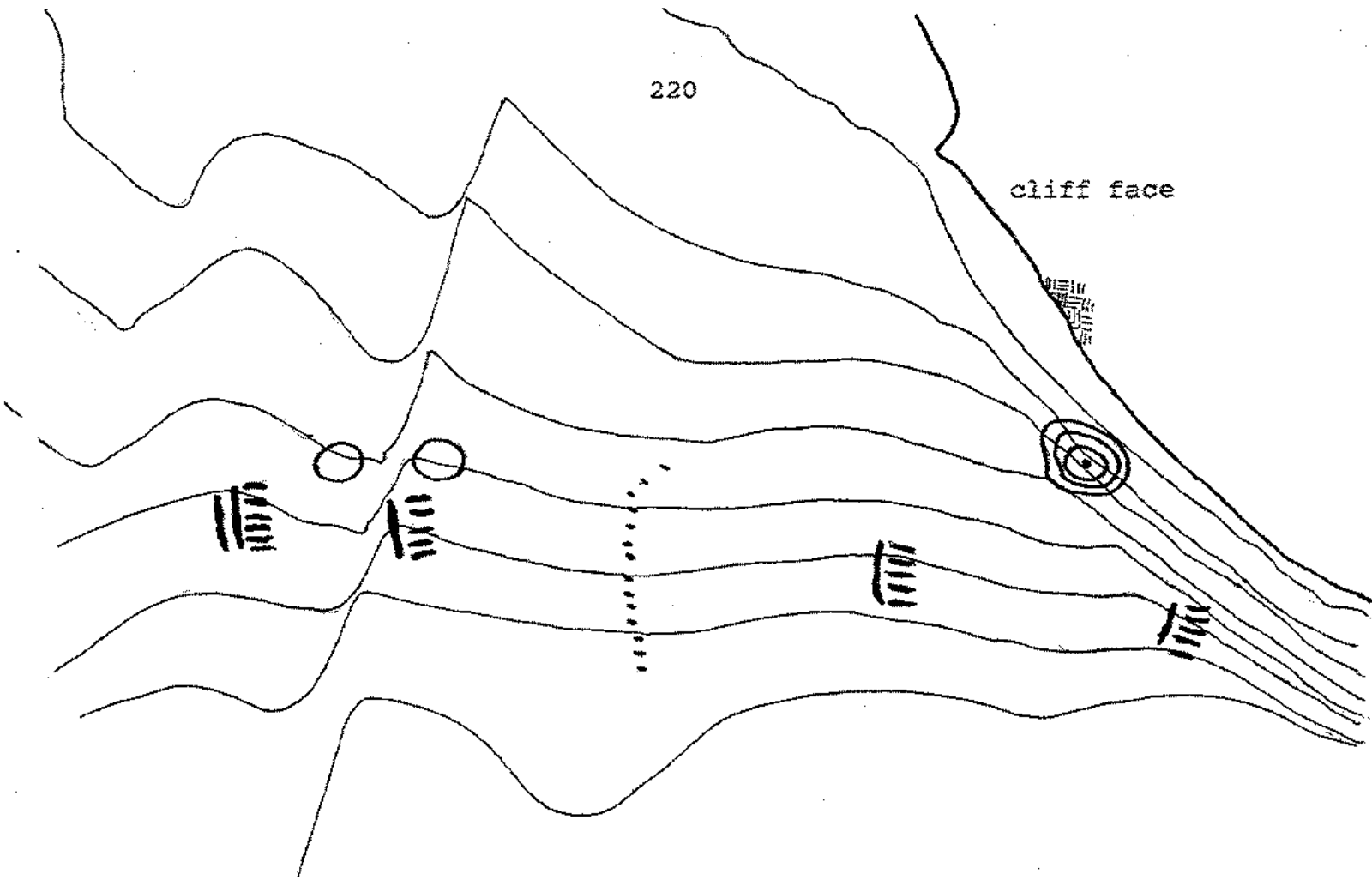


Figure 8. Shadow patterns cast by the sun at summer solstice as it passes over a concentric circle.

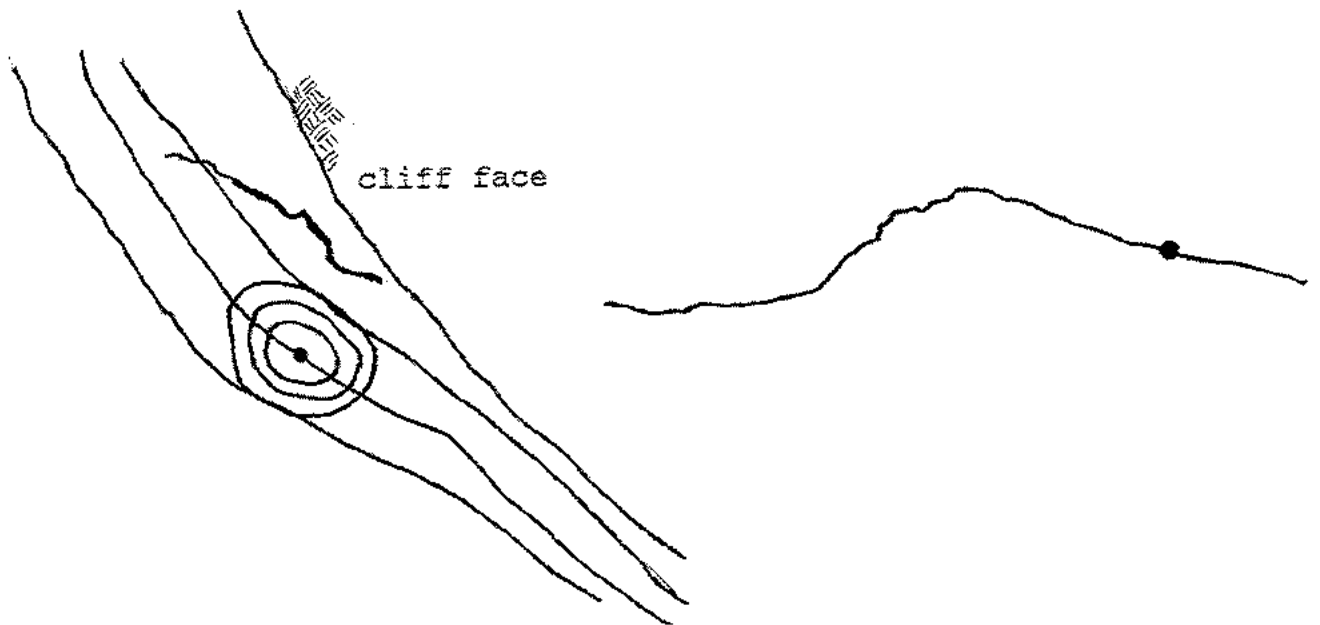


Figure 9. Shadow patterns at equinox and sunset position on the horizon.

the roof of the alcove. The sun will only be at this position for a few days at summer solstice. Both the position of the sun in the sharp point of the alcove and the horizon, and the sunlight entering the alcove to shine on the alcove wall, will only occur for a few days at summer solstice. The placement of the concentric circle appears then to be intentional. The interactions observed here establish yet another example where concentric circles are indicative of solar observation positions.

#### PANEL THREE

At summer solstice, as the sun was beginning to rise (as viewed from panel one) it was noted that sunlight was moving down over the north facing line of broken low cliffs. It was observed that sunlight appeared to shine first on a section of cliff just to the east of panel one. This indicated that the sun was coming up in a low point on the horizon. After observing the interactions at panel one, I went over to the approximate position where the sun first shone. I found there a previously unknown panel of rock art. I had walked past this point several times and not noted the presence of this panel. The panel is composed of three "shields". The one on the right is a large circle with a row of short lines across the bottom. The center image is a concentric circle. It is composed of three circles with an abraded area in the center. The image on the right is difficult to see because of weathering. It appears to be a simple circle. All of these images could be interpreted to be sun symbols. It appears that they were placed to mark the position of the sun on the horizon at summer solstice sunrise, but this has not been confirmed. Other observations at this panel have not been conducted. There is also another panel to the extreme right of panel two. No observations have been conducted at this panel.

#### PANEL FOUR

Panel four is located across the canyon from the panels discussed above. This is designated area "B". There are many panels in this area, not all of which have been investigated for solar alignments. Panel four consists of a well-made petroglyph of a small concentric circle. Also on the cliff face are the images of what appear to be four tracks, two circles, a vertical row of dots, and a snake, see Figure 8 (the snake is not shown in this Figure). A faint reddish stain on the cliff suggests that there may have been painted images here also, but no evidence is visually present to indicate what these images may have been.

The site was observed on summer solstice. Because of the position of the panel, sunrise on the horizon was not

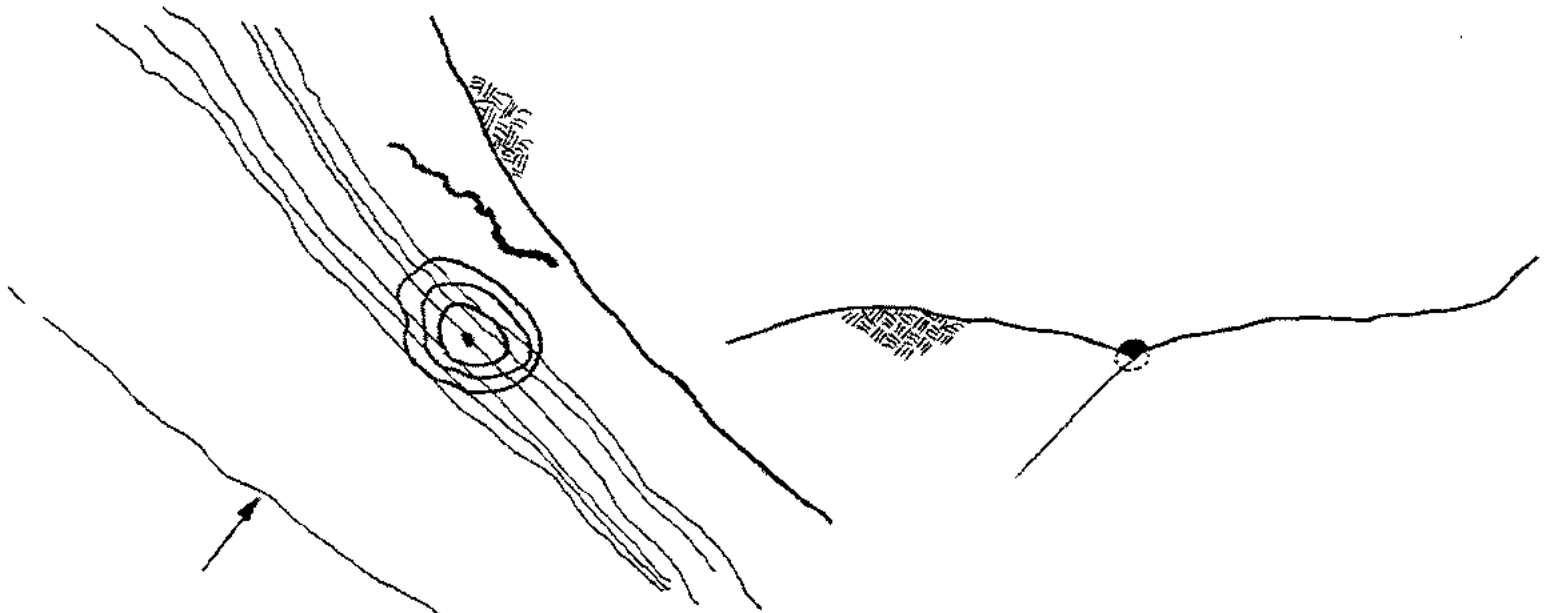


Figure 10. Shadow patterns at winter solstice and sunset position on the horizon.

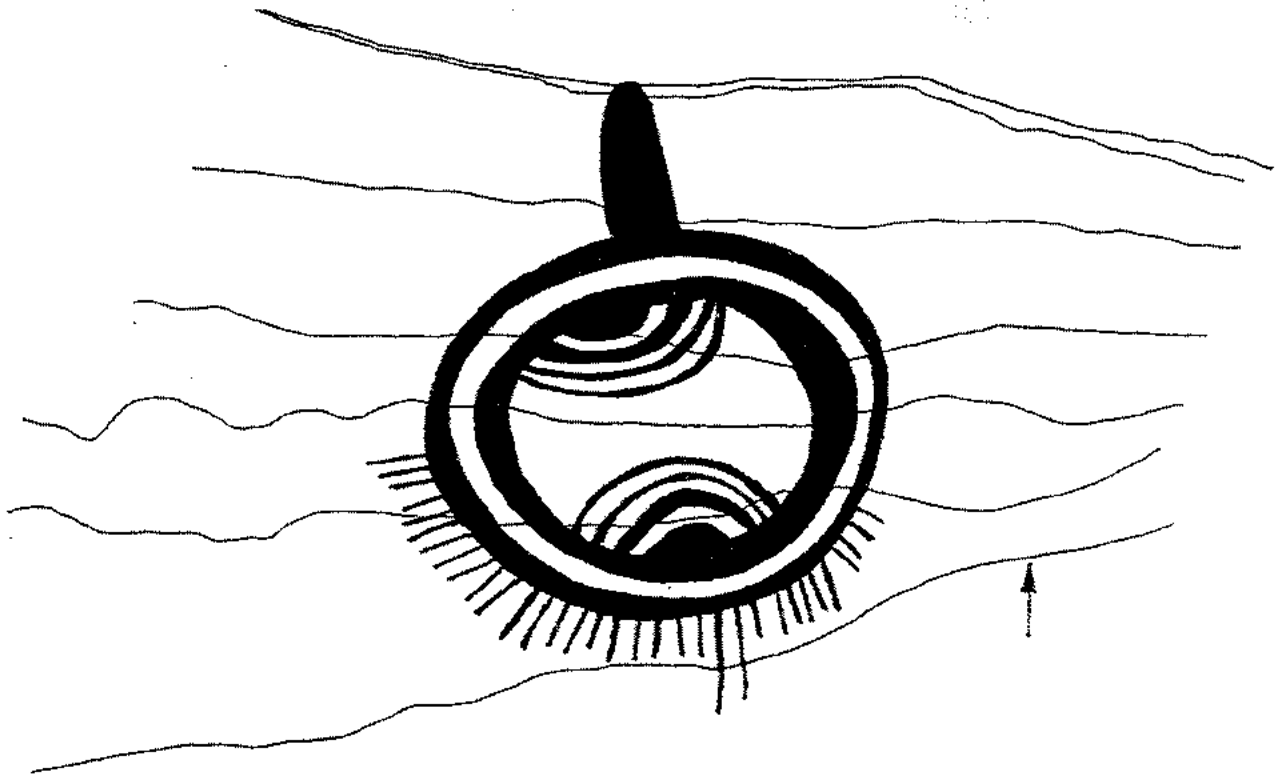


Figure 11. Shadow patterns at winter solstice on shield figure.

visible. The shadow cast by the sun as it passed over the panel is indicated in Figure 8. No alignments were apparent. The shadow moved all the way through the concentric circle. The sun then passed overhead and set out of view behind the cliffs.

At equinox the position of sunrise was again not visible from the horizon. As the sun passed by overhead the shadow passed through the concentric circle in much the same way that it did at summer solstice, see Figure 9. The sunset on the horizon however, was visible from the concentric circle in the panel. The sun set on a slope to the right of a small peak east of the site, see Figure 9.

At winter solstice the position of sunrise on the horizon was not visible from the panel. Sunlight was again observed to produce shadows on the cliff face as the sun passed overhead. These shadows are shown in Figure 10. Up to this point no significant interactions were observed. The most consequential event took place at sunset. The sun set into the point formed by the junction of two ridges, see Figure 10. This notch was also the lowest point on the horizon. As indicated, no shadow alignments occurred at the site during the periods investigated, nor apparently would they at any other time during the year since the sun passes over a relatively featureless edge to cast the shadow. (This would of course have to be investigated.) Even at winter solstice no significant shadow interactions took place. This evidence suggests that shadow interactions are not intentional at this panel, nor at all concentric circle images. The interaction with the horizon, only at winter solstice, suggests that the concentric circle was located at this precise point to mark an observation and determining point for winter solstice. This interaction again confirms the hypothesis being tested.

#### PANEL FIVE

Just to the left of panel four is a large and complex panel that is located on the back wall of a large rockshelter. Most of the images are paintings of horses (about 20) and culturally related features (see Castleton 1978, figure 5.19). There are also three painted stylized Anasazi handprints and perhaps eight red painted handprints, some with areas in the palm where paint does not occur. These handprints are characteristic of the Basketmaker Culture of Southern Utah and the San Juan River drainage. This is the farthest north that I have seen these handprints. Their presence here suggests a possible movement of people and ideologies through the area. Another possibility to explain their existence is that these handprints are copies that were done by people of later cultures - Utes for example. It is my opinion that these images were brought into the area by



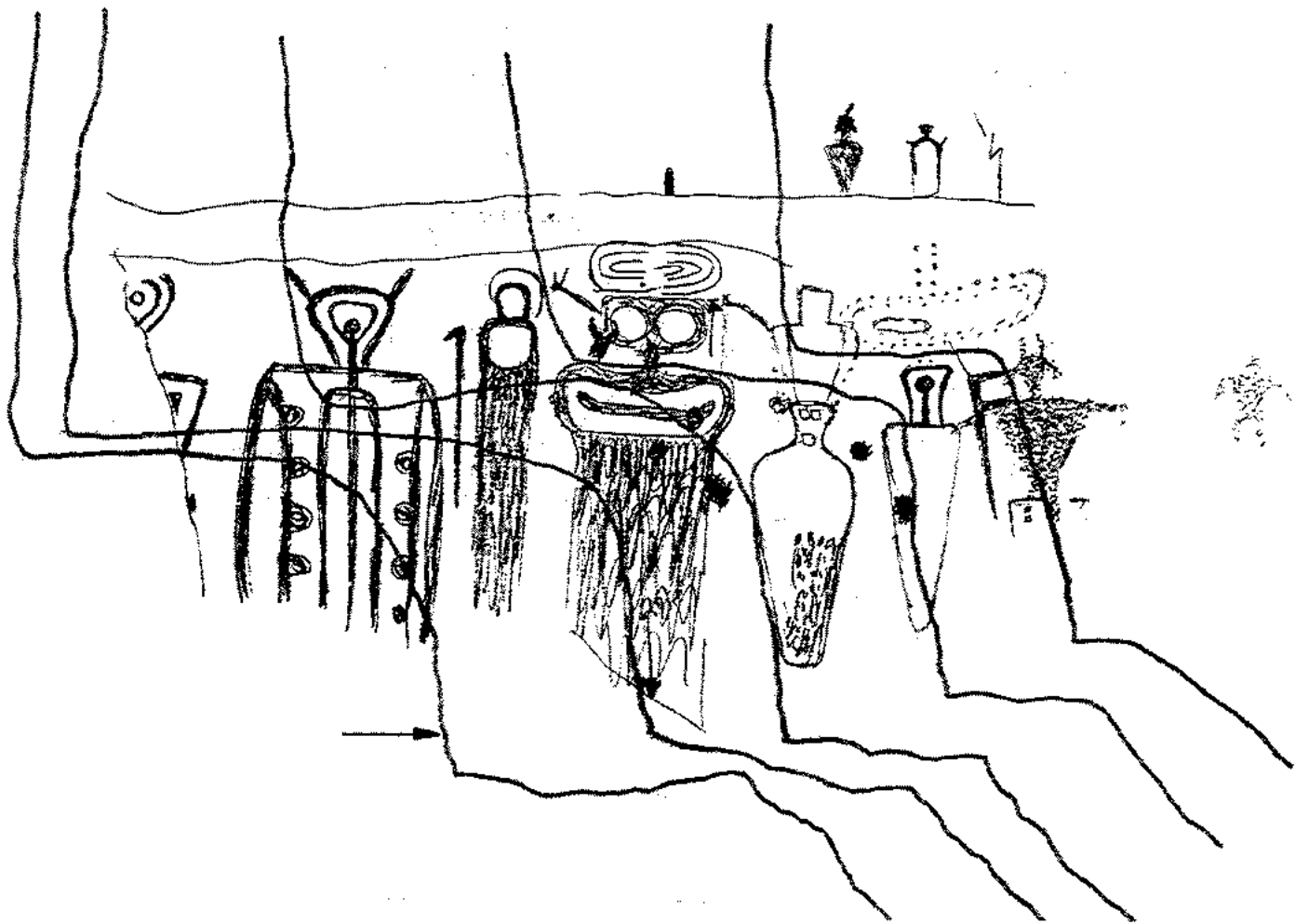


Figure 12. Barrier Canyon Style panel showing shadow patterns at winter solstice.

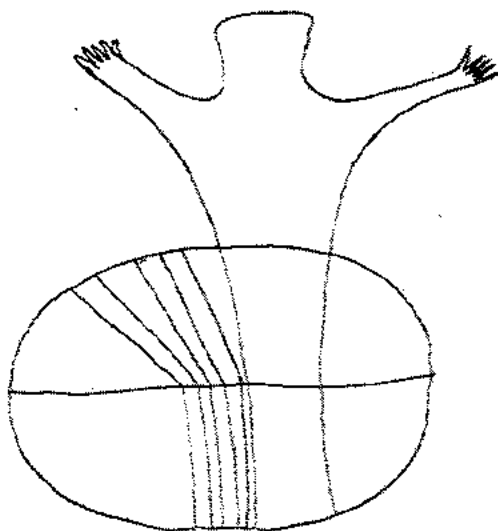


Figure 13. Shield figure above Barrier Canyon Style panel apparently painted in same color pigment.

the Anasazi Basketmaker and Pueblo people. There is evidence to substantiate this premise (Manning 1991).

Near the right side of this panel there is a large shield figure, see Figure 11. It is composed of a faint gray/black circle that has within it a white circle. Inside of the white circle is a broader red circle. The center is filled in with yellow except for two groups of arcs, one at the top and another at the bottom. The arcs are composed of a line each of red, yellow and white paint. The smallest arc is filled in with yellow pigment. The effect suggests a rainbow or a sunset. On top of the shield there is a red projection that is somewhat similar to others previously described, except that it does not contain a rounded portion at the top. Along the bottom half of the shield there is a row of short lines, which seem to suggest fringe or sunlight.

The presence of horses raises questions about the cultural affiliation of the shield figures that occur at these panels. Were they painted by Fremont, Ute, or plains Indians, or all three? It would appear that a detailed analysis of the pigment and weathering of these images would provide important information about the cultural interaction of the Fremont and later cultures.

The panel was observed at summer solstice. No significant shadow nor horizontal interactions occurred. The site was also observed at equinox with similar results. It was not until winter solstice that interesting interactions were observed. The position of the sun on the horizon was not visible from the site. As the sun moved toward the horizon the shadow cast by the ceiling of the rockshelter moved up over the shield figure. At the moment of sunset the shadow line just reached the tip of the projection on top of the shield, see Figure 11. This interaction suggests that the image may have been placed to mark the furthestmost extent of the sun into the rockshelter, which occurs at winter solstice. Thus, the image could have been utilized to serve a calendrical or a ceremonial function. It is interesting to speculate that the rounded projection on the top of the shield may represent a head (see Figures 14-16). If this is so then the person represented by the shield figure would 'see' sunset on the horizon only at winter solstice.

The sun set on the horizon, as far as I could determine without instruments, at almost exactly the same place as is illustrated in Figure 10. This is because the two panels are only a few meters apart. Both the interaction of the shadow and the position of the sun on the horizon could be used to predict and confirm the date of winter solstice. It appears from these observations, and the kinds of images that predict winter solstice, that this area was utilized for solar observations for several hundred years, and by several different

cultures. These observations show the possible dual nature of solar interactions.

#### PANEL SIX

Just to the west of panel five is a Barrier Canyon Style panel consisting of a row of anthropomorphs. The panel was first observed at winter solstice. The position of sunrise on the horizon was not visible from the panel. As the sun rose a shadow was cast over the panel as shown in the rough sketch in Figure 12. No significant interactions were noted.

The panel was observed at summer solstice. At that time a diffuse almost straight line passed over the panel at an angle, from left to right with no significant interactions. A similar shadow pattern occurred at equinox. The Barrier Canyon Style panel appears to have no solar interactions at these dates.

There are also several other panels at this location that have been given only a cursory surveillance. Others have not yet been observed at all. For example, there is an apparent shield and anthropomorph above the Barrier Canyon Style panel that was not included in solar observations. These images appear to have been painted with the same color pigment as the Barrier Canyon Style figures, see Figure 13.

Before leaving this area there are several comments that need to be made. There are several interesting spiral images that may have the potential for solar interaction. One that appears to, but does not, is found in a narrow space between two large boulders - one is larger than the other. There are many images that were made on the surface of the larger boulder. It is obvious that the smaller boulder fell against the larger boulder after the spiral image was pecked into the surface. The boulders are so close together that pecking any image in the space between them where the spiral occurs would be impossible. Shadows cast by the boulders align with the spiral, but these are false alignments, and no careful researcher would give them credibility.

#### PANEL SEVEN

Panel seven is one of several that occur in area "C". Some of the panels are, for the most part, located under a north facing ledge so that sunlight never falls on the images. Another group of images is placed where well defined shadows pass over them.

One panel, an apparent shield, that appears to contain a sun related symbol (Mallery 1893, Figure 1123; Schoolcraft 1851) was observed only momentarily at equinox and at summer

solstice. The possible sun symbol consists of a nearly round circle that is divided into six pie shaped segments. On four sides of the circle there are rows of short lines. The panel is shown in Figure 14. Sunlight did not shine on any of the images at winter solstice. At summer solstice there was a sharp point of light that passed through the center of the point where the pie shaped pieces intersect. As a pie shaped segment of sunlight approached the center of the image it appeared that it might coincide with one of the pie shaped segments. However, as can be seen in Figures 14 and 15, when one edge of the shadow aligned with one edge of the pie shaped segment, the shadow did not line up with the other edge. The point of the shadow did, however, pass through the center of the shield figure.

At equinox the sharp point of shadow in the lower left corner of Figure 14 passes through the face of the anthropomorph to the right. At this time the shadow passing through the shield figure is just a flat line. Slides of this interaction were shown in the symposium but are not illustrated here.

This panel, more than perhaps others at this site, serves to illustrate the subjectivity of shadow observations. Most people are poor observers, especially those not trained in scientific fields. Often the desire to have an event take place overshadows a person's judgement to the extent that it appears they actually cannot see what is really happening. Nowhere is this more apparent than in watching shadows move across rock art panels. Because of the closeness of the shadow alignment with the pie shaped segment, I predict that at some future time someone not familiar with this paper will indicate that the sunlight lined up perfectly with the pie shaped segment, and thus conclude that this interaction was responsible for the design of the shield figure.

Also at this site there is another similar panel (see Figure 16), which brings up another point. It seems reasonable to suppose that for any consistent meaning to be attached to images based upon solar interactions, similar images should interact in the same way. If there is any validity to the interaction just described then it should be repeated at a nearly identical image. Most likely, if the images are the same, but they do not interact in the same way, then the interaction may be just a coincidence. This is one of the problems with shadow interactions. Consistency has not been one of the primary characteristics of shadow observations. And since there is little consistency, there cannot be any reliable meaning ascribed to images defined by sun and shadow interactions. It will be interesting to determine if a similar interaction (an angle of light passing through the center) occurs with the other divided shield at another time of year.



Figure 14. Shadow patterns at summer solstice.



Figure 15. Shadow patterns at summer solstice.





Figure 16. Another example of a 'sun shield' and anthropomorph.



To concentrate only on watching shadows, as the papers published in past issues of *Utah Rock Art* illustrate, is to miss much of the importance of the interaction of the sun and rock art. An equal amount of time should be spent looking out toward the horizon, as is spent looking in toward the rock art. This is one point that I hope to establish in this paper.

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