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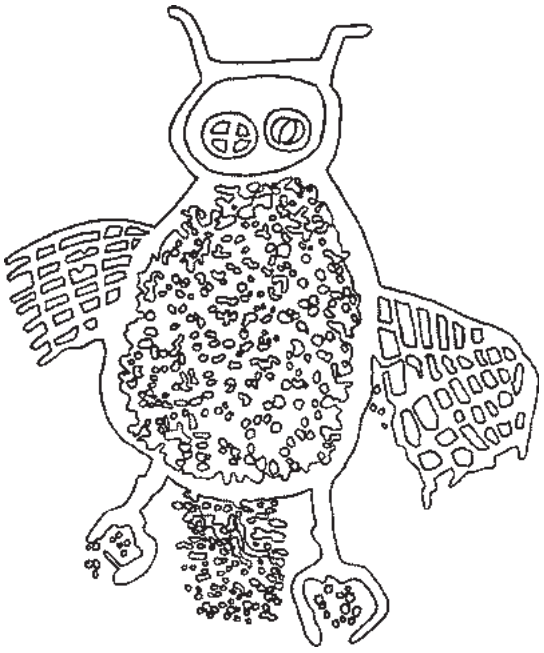

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EXPERIENCING ROCK ART: A PHENOMENOLOGICAL INVESTIGATION OF THE BARRIER CANYON TRADITION

The following is an extremely abridged version of a doctoral thesis submitted in 2007 to the Department of Anthropology, University College London. It is the result of three months of fieldwork in southeastern Utah. Sixty Barrier Canyon Style rock art sites were recorded throughout the region. The study is multi-disciplinary, combining an anthropological approach to material culture with ideas from a branch of philosophy known as "phenomenology."

PHENOMENOLOGY

Phenomenology is the philosophy of perception. It has its roots in the late 1800s, when a small group of philosophers found a need to critically examine the act of philosophizing. Philosophy, simply defined, is the study of knowledge—but where does this knowledge come from? Phenomenologists believed that most philosophers were starting their investigations too late, and were taking the existence of knowledge for granted. Before knowledge may be studied, they insisted, the origin of that knowledge must be considered. To do this, phenomenologists turned to perception, because all our knowledge of the outside world is ultimately acquired through our senses.

Perception is an active endeavor, one that involves the perceiver's entire body moving through space and interacting with the world. Exploring the world from a phenomenological perspective requires paying close attention to our experiences of the world as they are presented to us. In doing this, we come to understand that the natural world around us is not fixed; instead, it is in constant flux. For example, our perception of the size of a tree depends very much on how far away we stand from that tree. Phenomenology teaches us that the idea of an objective external world is an illusion. The world (from a human perspective) does not exist "out there"; rather, it *subsists* in the space between the subject and the object. The world is actively constructed as we experience it, and in order to truly know the world we must pay attention to *how* we experience it.

These ideas are useful for rock art researchers because rock art sites are emplaced. They are permanently fixed to the land, and they still exist in the same places they did when they were produced. In order to examine rock art, we must travel into the land; we must walk, hike, climb, and move about. Rock art is not just a visual medium—it is something that we experience with our entire bodies. It is therefore not enough to merely look at rock art. We must also examine the physicality of the art and of the places where the art was made, because these elements are as much a part of a "rock art site" as the images are.

Rock art sites don't just sit there, they *do* things. They tell us to "climb there," or "look up here." They tell us where and how we can (and cannot) move in the vicinity of the art. What makes this so exciting is the simple fact that we all must use our bodies to visit rock art sites, and that our bodies are really not so different than the bodies of the people who produced rock art. If we have to climb to reach a site, they also had to climb; if we have to look up, so did they.

Exploring the "experience" of rock art can be a useful tool in understanding its significance. To bridge the gap between experience and meaning, we turn to metaphor.

METAPHOR

Metaphor is a conceptual tool that allows us to create connections between abstract things that we cannot describe or define, with everyday things that we can experience directly. For example, "time is money" is a common metaphor in modern Western culture. Time is a very abstract idea and is difficult to talk about, so we equate it with money because the two have similar properties. Time, like money, can be saved, spent, wasted, and so on. Creating this mental link lets us conceive of time as a "thing," and to talk about it in ways that are otherwise impossible.

Metaphors are only effective when the experiences being drawn upon to create them are well-known. Building a metaphor around the experience of walking on the moon would not be very useful, since that experience is not shared by many. A close examination of the most common metaphors used today reveals that many of them draw upon very basic experiences of being in and moving about the world. This "experiential ground" is shared by all, and is relied upon heavily when constructing metaphors.

In order to understand how the experiences of traveling to and being at rock art sites might have been connected to past metaphors, it is important to spend some time becoming familiar with the experiences of being in the world of those who produced the rock art. In this investigation, we are exploring Utah's Barrier Canyon Style rock art. It was produced in an arid hinterland of canyons and plateaus. The more experiences a person has in this landscape—of its rocks, its water, its flora and fauna—the better off that person will be when it comes time to examine the rock art.

While exploring the experience of rock art, we must bear in mind that being in today's world is rather different than being in the world of past cultures. We live in a world filled with dichotomies such as "natural vs. artificial" and "indoors vs. outdoors" that have a strong influence on how we conceive of the world around us, especially the uninhabited canyons of the American Southwest. These dichotomies, and many other such modern concepts, were probably not present in the distant past. It is therefore important that we remain acutely aware of these differences as we examine the experiences of visiting rock art sites.

EXPERIENCING ROCK ART

The experience of rock art may be divided into three levels. First, sites must be accessed. If we assume that the location of rock art sites in the landscape is not arbitrary, then we can consider how the act of traveling to a site might have been significant. Second, we may explore how rock art sites and their surroundings are experienced physically. Visitors often need to climb or otherwise move about in the vicinity of rock art, and these experiences may have been meaningful. Finally, the experience of the art itself can be examined, in terms of its size, number, form, and so forth. Examples from Barrier Canyon Style rock art will be cited along the way.

Traveling to the Sites

Southeastern Utah is known affectionately as "canyon country," and it is easy to see why. When traveling through this land, it is often impossible to go straight from A to B, because there is usually a canyon or two in the way. The vast majority of the rock art sites in the Barrier Canyon tradition are located within canyons. They might be found at canyon intersections, at the back of dead-end side canyons, or someplace in between. The position of a rock art site within a canyon is important to consider, because it can affect the accessibility and visibility of a rock art site.

Sites located on what were probably major routes through the land would have been encountered more frequently than sites hidden away in seldom-visited corners. Consider Horseshoe Canyon,

Figure 1. *Several painted figures can be seen on the ceiling of this small, high alcove. Note the author's bags and hat on the floor of the alcove for scale.*

filled with abundant water and food sources, and riddled with caves and alcoves for shelter. Within Horseshoe Canyon we find the Great Gallery, an enormous rock art site that is clearly the product of many years of visitation and use. For anyone traveling through Horseshoe Canyon, the Great Gallery is located "along the way." The site is easy to see, and its position along the canyon floor makes it easy to reach. It would have been noticed and possibly visited by anyone who passed through the area.

Compare this with the site shown in Figure 1. The figures at this site are just a few inches tall, and are tucked on the ceiling of an alcove high above the canyon floor. The art is basically invisible from the canyon below. To reach the alcove, a visitor must climb, and there is but one way up. Unlike the great gallery, which is found "along the way," a visit to this site would have been a dedicated journey. Even for someone passing through the canyon where the alcove is found, a visit to the site would have required a separate side trip up the cliff. Sites like these, hidden away in secret corners of the land, are far less likely to be stumbled upon, and visits to them would have been more intentional.

Lastly, the site shown in Figure 2 represents something else entirely. It is large—not on the scale of the Great Gallery, but its two-meter-tall anthropomorphs are nonetheless impressive. The site is found high on a cliff, so high in fact that it is easy to miss when walking past it along the canyon floor far below. The images are today very faded, but in the past they would have been clearly visible to anyone who happened to be looking up.

Despite the site's visibility, it is not easy to reach. Moreover, even after a long climb up the cliff face, the images are very difficult to view. The ledge below them is narrow and precarious, and the visitor must cling to the rock face, looking up at an awkward angle to see the images which, from that vantage point, still loom overhead. Interestingly, the rock art contains details that are only visible from this close point of view. This site seems to lack an optimal viewing point—one must either squint at the panel from below, not really able to see what is happening, or must climb

Figure 2. *The decorated panel is outlined with a white rectangle. The distance from the bottom of the cliff to the bottom of the rectangle is approximately 35 meters. Today, the images are mostly obscured by a thin layer of translucent calcite left by water running over the decorated rock face.*

up and up to reach the images, while at the same time sacrificing an overall view of the site.

By deciding where to put rock art, ancient artists were able to exercise control over how it was viewed. Artists could encourage or discourage visitation by choosing what canyon to place the images in, where in that canyon the panel would be, and even where on the rock face the images were put. This idea can be extended beyond just the physical images and towards the significance behind them. By controlling access to the rock art, ancient artists were able to control access to ideas.

The location of a rock art site in the landscape also forges an experience for the visitor. A journey to the Great Gallery is hardly an ordeal, especially for someone already traveling through Horseshoe Canyon. The site in Figure 2, however, requires a considerable climb to reach. By placing this rock art panel high up a cliff, the artist is able to influence how (and perhaps by whom) the art is accessed, even thousands of years later by people from a completely different culture.

Too often, researchers do not begin to record rock art until they are standing right there at the base of the rock. Instead, we should consider a visit to a rock art site to be a journey—one which may have had a significant impact on the meaning of the site itself. Even if this journey begins in the main canyon, and only consists of a short walk up a side wash and into an alcove where a rock art site can be found, this journey is still an integral part of the rock art itself.

Being at the Sites

Just as the location of a site in the greater landscape is capable of forging experience, the physicality of the site itself can influence how a rock art site is experienced. Rock art sites are places, and often, these places are somehow set apart from the surrounding land. A site might consist of an alcove, a rock outcrop, or even a lone boulder. These are all places in and of themselves, complete with boundaries, real or imagined, that create possibilities and shape experiences.

Alcoves have entrances and walls—they can be entered and explored, and they limit how and where the visitor can move. Rock outcrops are approached rather than entered, and visitors walk up and down their length, viewing rock art along the way. Lone boulders offer even more freedom, allowing visitors to come up from any direction, and explore all sides of the stone in a search for images. In choosing what kind of place to enhance with rock art images, artists were able to control how the images were viewed.

The Great Gallery consists of a long line of images painted along a cliff face. A ledge below the panel offers a close-up view, while the canyon floor below lets visitors step back and take it all in. The view from the canyon floor is open. One can walk about and explore the site freely. Once on the ledge, however, this freedom is reduced, and visitors can move only in one direction, and must view all the images in a particular order from left to right.

If we consider how viewing a "gallery" style site differs from the freedom of approach offered by a boulder site (which lets visitors view the rock art upside-down and sideways if they like), it becomes clear that the shape of a place can have an enormous impact on the experience of visiting a rock art site. Sometimes rock art can be viewed while standing on flat, stable ground, with the visitor looking straight across to see images placed at eye level. Other times, visitors must perch precariously on high ledges, straining their necks to see what there is to see.

Other characteristics that make up the "places" where rock art is found might be less obvious. A visit to a site located in a canyon with a permanent water source, for example, will be backed by the smell of vegetation, and by the sounds of rustling leaves and gurgling water. This stands in stark

contrast to the ambiance of a site found in a shallow dry wash, or on a boulder in the middle of a juniper forest.

Rock art sites are places, and every visit to a site is a multisensory experience that involves quite a lot more than just looking at pictures on a rock. The shape of a place tells visitors where and how they can (and cannot) move. These places may be large and open, capable of supporting dozens of visitors at once, or they may be small and intimate. Viewing the art within these places might be a simple endeavor, or it might require delicate climbing and careful planning. But most importantly, these places were consciously chosen by ancient artists for the production of rock art.

A look at the sorts of places where Barrier Canyon Style rock art is found reveals some interesting patterns. Most sites in the tradition are found on surfaces that are somehow set into the surrounding rock—the surface might be the back of a deep alcove, or just a shallow recess where darkly patinated rock has spalled away, leaving a lighter interior surface beneath. Often, rock art sites in this tradition have ledges below them, where visitors can stand to view the images. After spending some time visiting Barrier Canyon Style rock art sites, a person gains the ability to predict where new sites might be found, based only on the physical characteristics and location of places in the landscape. It seems that certain kinds of places were important to the people who made Barrier Canyon Style rock art; the implications of this will be explored a bit later.

Experiencing the Art

The nature of the images themselves also influence how a rock art site experienced. The size of images, their form, and their location on the rock are all significant. Consider a site that consists of a few small images scattered across the top of a boulder. The visitor can walk around the rock, looking at the images from every possible angle. There might not even be a clue as to how the panel is supposed to be oriented. In contrast, imagine a site that consists of a single life-sized anthropomorph painted on a cliff face. Perhaps the figure is undecorated, except for a pair of blank eyes. The visitor can walk right up to the figure, and stare it in the face. These two rock art sites offer incredibly different experiences.

More than half of all motifs in Barrier Canyon Style rock art are anthropomorphs, many of which are large—even life-sized. Some are more naturalistic than others, but all are capable of evoking bodily presences. These anthropomorphic motifs take on a unique role in the rock art, acting as agents that "stand in" for the artists who painted them. When visiting a rock art site dominated by anthropomorphic forms, it is easy to imagine that it is those anthropomorphs who brought you there, and who tell you how to climb and where to look. The figures contain the agency of the artist, and this agency can influence others even long after the artist is gone.

The encounter described above of a lone visitor staring a life-sized anthropomorph in the eyes is a powerful example of how these images can act as agents. This intimate encounter stands in contrast to a solo visit to the Great Gallery, where the visitor is outnumbered by a horde of larger-than-life anthropomorphs staring down from the cliff face. This relationship is not static however, and can change as the visitor moves closer to the rock art. From the ledge below the panel, only a few of the anthropomorphs can be seen at once, resulting in a shift in the social "atmosphere" of the site.

The anthropomorphic forms in Barrier Canyon Style rock art work to modulate space—both physical space and social space. The visitor moves about the site in relation to the anthropomorphs, which in turn dictate to the visitor where and how they will move. The figures on the rock might outnumber the visitor, or an encounter may be a more intimate one-on-one ordeal. Anthropo-

morphs that are larger than life can intimidate, while small and abstract figures barely recall a bodily presence at all.

Again, it is important to remember that the artist had control over all of these factors. A rock art site is much more than a group of images stuck to a surface. The artist, through the art and its surroundings, was able to instigate journeys, encourage encounters, modulate social space, and much more—all across an unlimited span of space and time.

THE ART

Before coming to any conclusions, some things should be said about the actual content of Barrier Canyon Style rock art. It was mentioned that more than half of all motifs are anthropomorphs. These figures come in varying degrees of abstractness. Some look very human, while others consist of an empty square torso with a small knob-shaped head, and only barely recall the form of a body. The anthropomorphs in this rock art frequently lack limbs, though other appendages like wings and antennae are sometimes present, making the figures appear even more other-worldly.

Animal forms are abundant, and more often than not, these figures are shown in close association with the anthropomorphs. These generally come in one of three forms—snakes, birds, and quadrupeds. Snakes are depicted flanking anthropomorphs, or are sometimes held in their hands. Birds and quadrupeds often hover about the heads and shoulders of the anthropomorphic figures. A literal interpretation of these animal motifs, and of the relationships depicted between the anthropomorphs and the animals, is unlikely.

Many other motifs are present across the tradition, though many are not recognizable to the modern visitor. The focus of the art, however, seems to be the anthropomorphs, which are present in every site recorded for this study. It was mentioned that these motifs have agentive properties, and that Barrier Canyon Style rock art has a strong focus on social participation. Visitors come to the sites to interact with these anthropomorphic forms, and to forge, maintain, or possibly even contest relationships with whatever entities they represent.

More than half of all rock art sites in this tradition are located within alcoves or spalled areas—on surfaces that are set into the rock itself. These places are, in turn, mostly found in canyons. The focus was therefore on the interior surfaces of subterranean places—the deepest accessible places in the study area. Given the non-naturalistic nature of the anthropomorphs and other elements in the art, it is not a far stretch to imagine that Barrier Canyon Style rock art is somehow connected with the spirit world.

If this is true, then rock art sites in this tradition may have been places where people could interact with this other world. The rock faces that were decorated with images are boundaries between places where humans can move freely, and places where humans can never go—the inside of the rock, or the underworld. By creating images on these interior surfaces *that represent or embody the world that lies beyond them*, ancient artists turned something that is inaccessible by normal means (the spirit world) into something which could be directly experienced by all (the rock art).

This idea in effect brings the discussion back full circle, to the idea of metaphor that was introduced earlier. Barrier Canyon Style rock art sites turn the ineffable into something experiential. They afford access to the spirit world by means of dedicated journeys that end in special places where powerful images have been created—images that represent the world which lies beyond the rock. The nature of these experiences (as well as access to them) was controlled by choosing places in the landscape with particular properties.

This project was more an exploration of possibilities than a search for answers. The

conclusions drawn are nothing that has not been said before. What is new is the path that brought us there. A phenomenological approach to rock art, and to other emplaced cultural artifacts, follows a middle path between pure scientific empiricism and pure subjective opinion. In effect, this approach lets rock art researchers say what they have always wanted to say, while at the same time backing their ideas with reproducible experiential data. By setting aside the ubiquitous question of "what does rock art mean," and instead asking "how does rock art work," we might be able to learn quite a lot about the worldview of ancient peoples.

James A. McNeil

MAKING LEMONADE: USING GRAFFITI TO DATE PETROGLYPHS

Petroglyphs, a form of rock art consisting of images pecked on rock surfaces, comprise one of the most important archaeological features of the Colorado Plateau region (Cole 2009). They provide glimpses into the life, behaviors, and customs of the prehistoric peoples who created them. Petroglyphs are widely distributed geographically and are composed of a broad sweep of themes relating to essentially everything of social significance to the people who created them. An important step in relating these images to other artifacts would be a reliable and non-destructive way of dating them.

For a review of rock art dating methods see Chapter 5 in Francis and Loendorf (2002). Relative dates can be discerned through superimposition and through relative levels of repatination although Dorn (2007) warns against this practice due to micro-environmental and other effects. Themes and styles can also provide approximate dates principally through associa-tion with dateable artifacts of similar theme located nearby. Direct physical dating of rock art has been attempted using a variety of methods including accelerator mass spectroscopy (AMS) measurements of ^{14}C, Particle-induced X-ray Excitation (PIXE), analysis of (K+Ca)/Ti cation ratios, and studies of micro-laminations in the desert varnish (Dorn 1989, 1994, 1998a, 1998b, 2007; Dorn and Oberlander 1981). There are some clear successes with these approaches, but some controversy as well (Beck et al. 1998). One major drawback to these methods is their cost and the requirement of a physical sample which damages the artifact.

Another approach makes use of the desert varnish, the dark pigment that accumulates on rock surfaces throughout the desert southwest. Desert varnish is unusually rich in manganese while the underlying base rock generally contains very little of it. Dorn and Oberlander (1981) found that the manganese accumulates through a metallogenic microbial process. Since the underlying rock is generally poor in manganese, the manganese in the desert varnish must arrive on the rock surface as dust from elsewhere which is then fixed by the metallogenic microbes. However, this process is poorly understood and other processes that transport Mn may be involved. Lytle et al. (2008) has developed a direct dating method based on portable X-ray fluorescence (XRF) measurements of manganese accumulation in petroglyphs. The hope is that if the manganese level can be correlated to known dates, one can estimate the age of the rock. The operating assumption of Lytle et al. is that when a glyph is pecked onto a rock surface, the patina is completely removed and the manganese accumulation process begins anew *at a constant rate*. However, as it is a biological process, growth rates are highly variable, depending on micro environmental conditions, moisture, dust, surface orientation and texture, over/underhang, etc. In addition, the pecked surfaces of petroglyphs are more susceptible to erosion and spalling—further complicating the picture.

Lytle et al. (2009) calibrated their XRF manganese measurements to dates determined though other methods including cosmogenic ^{10}Be and ^{26}Al levels as well as geologically significant events such as the Bonneville Flood (14,300 B.P.). They reported an approximately linear correlation between age and Mn accumulation. Their calibration curve extends to 35,000 B.P. with the youngest cosmogenic standards dating over 10,000 B.P. while their youngest geological standards are around 1500–2500 B.P. (much of these are systematically below their calibration line, however). They further claim that their

calibration line, corrected for surface slope effects, is universal, independent of location or base rock—a claim which seems problematic given the existence of rock faces that display high levels of local variability.

The purpose of this work is to determine the feasibility of using X-ray fluorescence (XRF) measurements of manganese in petroglyphs in the manner of Lytle et al., but using dated graffiti located on or adjacent to the petroglyph as a *local* calibration standard to estimate the age of the rock art. Unlike Lytle et al. we do not assume that the manganese accumulation rates are universal. The major limitation of this approach is that it can only be used under the special circumstances where the graffiti and target petroglyphs are superimposed or adjacent. Fortunately, the Colorado Plateau has several sites where these conditions are met. In this talk I present results for graffiti and petroglyphs found in the vicinities of Bluff and Moab, Utah.

The descriptions of the XRF device, the experimental procedures, data analysis methods, and the Sand Island petroglyph measurements were previously reported to the Comb Ridge Heritage Initiative Project, University of Colorado under contract to the BLM, Catherine M. Cameron, Principal Investigator. The "Dancing Bear" site results are new.

DESCRIPTION OF THE XRF DEVICE

X-ray fluorescence[1] (XRF) is widely used as an important tool in analytic materials research. XRF is the re-radiation (fluorescence) by atoms in the x-ray part of the spectrum following excitation. Atoms that are bombarded with primary x-rays or charged particles of sufficient energy can have inner shell electrons knocked out. When one of the atom's other electrons drops into the shell vacancy, it emits a (secondary) x-ray photon with an energy characteristic of the element. In this way the spectrum (number of photons as a function of energy) of the emitting atom can be used to identify it. In the case of manganese there are primarily two x-ray energies that can be used for identification, the so-called K_α and K_β x-rays at 5.90 keV and 6.49 keV, respectively. The red sandstone in the Colorado Plateau is rich in iron as well which has characteristic XRF photons at energies of 6.40 keV and 7.06 keV. As there is an experimental width of approximately 0.2 keV, the Mn K_β and Fe K_α spectra will overlap requiring that in the analysis both are taken into account simultaneously.

In order to detect very low levels of manganese in narrowly-pecked graffiti it was necessary to construct an XRF device, capable of being deployed in the field, with millimeter spatial resolution, and mounted on a stable platform that allows long collection times (~5-60 minutes). We assembled such a device from the following components:

1. AmpTek Mini-X, x-ray tube (Comet EDiX-40-4-Ag) with power supply and USB controller and software.
2. Ortec EASY-MCA-2K Multichannel Analyzer (MCA) with USB interface and MAESTRO-32 (TM) software.
3. AmpTek XR-100T x-ray detector and power supply with pulse shaping amplifier.
4. 12-V automobile battery with sine-wave inverter.
5. Tripod with boom and counterweight, mounting plate, +/- 20mm XY-translation stage.
6. Laptop PC, monitoring meters, and cables.

Figure 1 shows a schematic of the XRF device. The Mini-X and XR-100T were attached to an aluminum plate with their principal axes separated by 40 degrees. The XR-100T consists of a temperature-controlled 7 mm^2 Si-PIN detector with a thin Beryllium window. The detector produces Mn K_α peak widths of about 0.15 keV (full width at half maximum). In the field we found that the detector amplifier would drift slightly as the ambient temperature of the electronics bin changed. The high voltage and current of the

[1] For an introduction to XRF visit http://en.wikipedia.org/wiki/X-ray_fluorescence.

Mini-X can be adjusted from 10–40 kV and 5–200 μA, respectively (although the current at the higher voltages is limited to 100 μA). A custom collimator for the Mini-X was machined from brass to provide a narrow beam diameter of 1.58 mm. The Mini-X and XR-100T units were then mounted on an optical XY-translation stage which permitted sub-millimeter positioning of the x-ray beam on the target. Soft rubber tubing was fitted to the collimator tip to avoid any potential damage should it inadvertently come in contact with the petroglyph. Figure 2 shows the XRF head unit mounted on the tripod boom (without cables). To provide 120 VAC the battery was connected to a 150 W pure sine-wave inverter. The automobile battery capacity was about 50 A-hrs which was sufficient for about 6 hours of operation in the field. The tripod has a 1 m (~3') equilateral triangle base modified with one adjustable leg and a vertical extent of 3.5 m (~12'). The battery, inverter, power supplies, amplifiers, MCA, and USB hub were housed in a plastic crate with a lid to keep out dust and moisture. A 4.5 m (~15') custom cable bundle was constructed to connect the XRF unit to the electronic crate. The power supply and USB cable from the computer were then connected to the USB port and 120 VAC power in the electronic crate. In steady state the system (including the computer) drew about 4.5 A (54 W) from the battery.

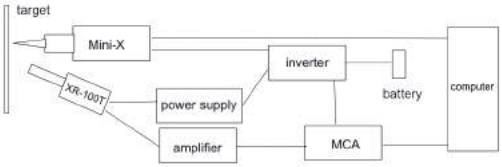


Figure 1. *Schematic of the XRF device.*

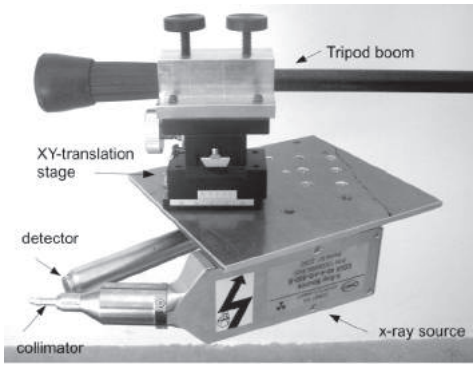


Figure 2. *Photograph of the XRF head unit showing the x-ray source and detector mounted on an XY-translation stage and boom.*

EXPERIMENTAL PROCEDURE

Before deploying the XRF device in the field, it was tested in the laboratory. Since we were focussed on the Mn–Fe energy region (5–7 keV), we set the high voltage on the Mini-X between 10–15 kV. To avoid data "pile up" (false double counts) while keeping the run times as low as possible, the current was adjusted between 15–100 μA such that the dead-time (signal processing "overhead") was about 1–3 percent. As a safety precaution, the CSM radiation safety officer inspected the device and surveyed the radiation in the vicinity of the device with a geiger area monitor to estimate the radiation exposures that could be expected and found very slight exposures could be expected. Nevertheless, standard precautions of shielding, distance, and time were adopted to minimize exposures, and radiation badges were used to monitor exposure levels.

For testing and calibration purposes a standard Mn target was fabricated by Dr. Joseph Beach of the CSM condensed matter group by depositing 158 nm of Mn on a glass slide. Using the sharp edge of this target, we determined the spatial resolution of the device to be less than 2.0 mm when fitted with the 1.58 mm-diameter collimator.

We adopted the following procedure in deploying the device in the field. Upon arrival at the site of the target glyph (graffiti/petroglyph), the tripod was set about 1 m from the rock face and one leg adjusted to have the tripod shaft be approximately vertical. The electronic crate was set near the base of the tripod and the computer set on a field table about 2 m away. The XRF head was then mounted on the tripod boom and vertically adjusted to be at the same level as the glyph and horizontally adjusted to be within about 2 cm of the glyph.

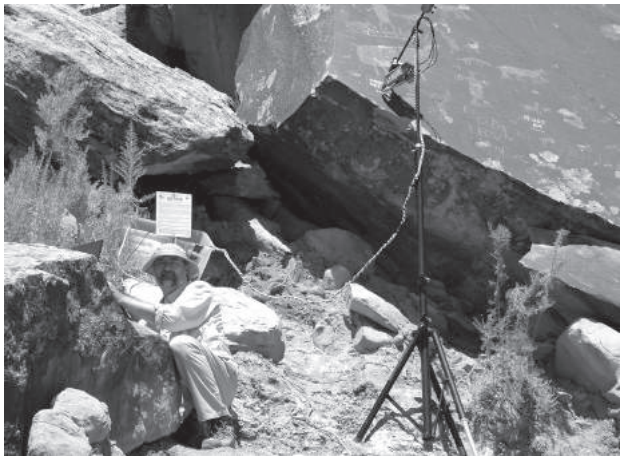


Figure 3. *XRF device deployed at the "Dancing Bear" panel near Moab, Utah.*

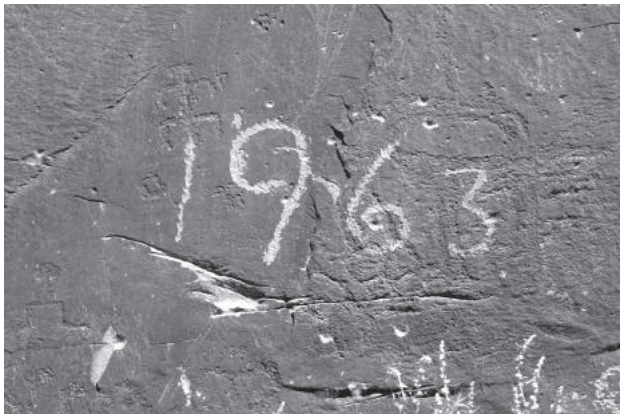


Figure 4. *Photograph of sample SI-1963a, Sand Island, Utah.*

The Mini-X interrupt jumper was installed, all cables connected, and the system powered up. Finally, the computer was booted up and the Mini-X controller and Maestro-32 (MCA) software launched. From the computer we set the Mini-X high voltage and current as well as the MCA live-time preset. The system was then tested for about 3–5 minutes using the standard thin-film Mn slide as the target. Each data run was recorded in Maestro's SPE-format which is ASCII readable. We made use of the live-time preset feature in the Maestro software to have runs of uniform duration, typically of 5–15 minutes. Figure 3 shows the device deployed at the "Dancing Bear" panel near Dewey Bridge north of Moab, Utah.

DESCRIPTION OF DATA COLLECTION

Graffiti/petroglyphs of Sand Island

The Sand Island petroglyph site is located on BLM land near Bluff, Utah. We received permission to conduct our experiments from the BLM Field Office, Monticello, Utah, and our work was supervised and monitored by archaeologist, Winston Hurst. (This portion of the work was supported in part by the Comb Ridge Initiative Heritage Project [Catherine Cameron, CU Boulder, Principal Investigator] and the description below is extracted from the resulting report.)

Sample SI-1963a–b. Prior to traveling to the region, we had identified several candidate panels at Sand Island that consisted of modern graffiti superimposed on or immediately adjacent to older petroglyphs. The first set of glyphs we measured, identified here as SI-1963a (the "3" of the "1963" graffito) and SI-1963b ("quadruped" petroglyph), is shown in Figure 4. It consists of a modern graffito "1963" superimposed on a big-horn sheep petroglyph of perhaps an archaic style.

We set up our apparatus following the procedure described in the previous section. We took seven 900-second measurements along a 2 cm section of the horizontal line in the "3" and along a parallel line directly above it within the petroglyph. In addition we took three 900-second measurements of the background patina directly above the petroglyph. We also took 300-second measurements of the Mn calibration target at the beginning and end of the session. The spectrum from each run was stored on the computer for later analysis.

From the first thin-film Mn calibration spectrum we observed the dominant Mn K_α peak at around channel 230 (~ 5.9 keV in Figure 7). In the final Mn calibration spectrum taken at the end of the

Figure 5. *XRF set up for one run of sample SI-1963b, Sand Island, Utah.*

Figure 6. *"Dancing Bear" panel near Moab, Utah.*

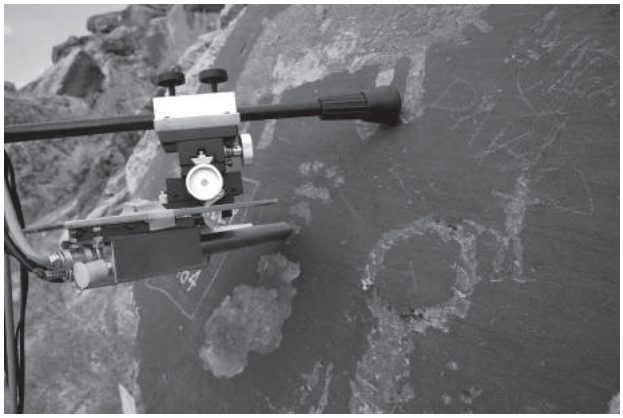


Figure 7. *Close up of XRF device taking data of the "Dancing Bear" panel near Moab, Utah.*

day, we noted that the Mn K-alpha peak dropped approximately 7 channels (0.18 keV) due to temperature-induced drift of the amplifier through the day. However, the gaussian widths were 7.0 channels for both spectra so the resolution of the instrument was not significantly affected by the temperature and a simple shift transformation will allow the spectra from the various runs to be accumulated.

Sample SI-1963c–d. The second set of glyphs we measured, identified here as SI-1963c-d, is shown in Figure 5 along with the XRF head positioned to measure the background patina adjacent to the "1". These samples consist of modern graffiti, SI-1963c (the "1" of the "1963" graffito) superimposed on a lizard petroglyph, SI-1963d, of perhaps a Pueblo I-II style (AD 750–1150).

We took three 900-second measurements along the ~1cm width of the "1" in the "1963" graffito, and four additional 900-second measurements in the "1" approximately 1 cm below the previous. We took two 900-second measurements in the tail region of the lizard petroglyph immediately above the "1." In addition we took three 900-second measurements of the background patina to the left and right of the lizard's tail as well as three 300-second measurements of the thin-film Mn slide. The spectrum from each run was stored in separate files on the computer for later analysis.

The "Dancing Bear" Panel. The "Dancing Bear" petroglyph panel, Figure 6, is located on BLM land north of Moab, Utah. This panel consists of modern graffiti immediately adjacent to petroglyphs of various styles. We took measurements of the "Harley Nelson\1964" graffito, and the adjacent "bear paw" and "lobe head" petroglyphs immediately to the right as seen in Figure 6 as well as another "lobe head" petroglyph located behind the main panel. We received permission to conduct the experiments from Leigh Grench of the BLM Field Office, Moab, Utah. Figure 7 shows a close up of the XRF device taking measurements of the bear paw petroglyph.

Sample DB-1964a ("Harley Nelson 1964" graffito). The first glyph measured, identified here as DB-1964a, shown in Figure 6, consists of a modern graffito ("Harley Nelson\1964") adjacent to several petroglyphs. We set up our apparatus following the procedure described in the previous section. We set the Mini-X to 15 kV and 100 μA. The higher current allowed faster data collection while still keeping the dead time below 4 percent. We took one 600-second measurement of each letter/number in the "Harley Nelson\1964" graffito using the XY-translation stage to position the x-ray beam accurately. We also took a 200-second measurement of the thin-film Mn calibration target at the end of the session as well as a 300-second measurement of the background patina near the "1." The spectrum from each run was stored on the computer for later analysis.

Sample DB-1964b ("bear paw" glyph). The next glyph measured, identified here as DB-1964b, was the (possibly) Ute-style bear paw located immediately to the right of the "Harley Nelson" graffito as shown in Figures 6 and 7. The Mini-X settings were the same as for sample DB-1964a. We took one 600-second measurement of the lower pad of the bear paw and stored the spectrum for later analysis.

Sample DB-1964c ("lobe head #1" glyph). The next glyph measured, identified here as DB-1964c, was the (possibly) archaic lobe-head figure located immediately to the right of the "bear paw" glyph as shown in Figures 6 and 7. The Mini-X settings were the same as for sample DB-1964a. We took one 600-second measurements of the foot region using the XY-translation stage to position the x-ray beam accurately. The spectrum from each run was stored on the computer for later analysis.

Sample DB-1964d ("lobe head #2", referred to as "solar deity" in the talk). The next glyph measured, identified here as DB-1964d, was the (possibly) archaic lobe-head figure located on a rock behind the main panel. The Mini-X settings were the same as for sample DB-1964a. We took one 600-second measurement in the region of the right arm as well as a 600-second measurement of the background patina immediately below the right arm of the petroglyph. The spectrum from each run was stored on the computer for later analysis.

DATA ANALYSIS

All data analysis was performed in *Mathematica* (Wolfram 1999). We wrote a subroutine to import the "SPE" formatted files stored by the Maestreo data acquisition software and used Mathematica's internal "FindFit" function to determine the fit parameters. The errors quoted are statistical only and were determined by a χ^2 analysis at the 90 percent confidence level.

Mn Calibration

In order to convert XRF data into absolute Mn surface densities, we used a thin-film Mn standard target created by Dr. Joseph Beach who deposited on a glass slide 158 nm as determined from profilometer and independent commercial XRF measurements. Figure 8 shows one XRF spectrum for this target with the x-ray source set at 15 kV and 60 μA.

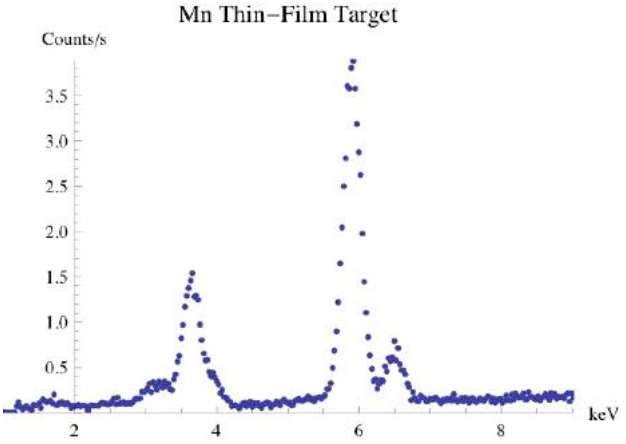


Figure 8. *XRF spectrum of the thin-film Mn calibration target.*

To determine the calibration constant needed to convert count rate into Mn surface density, we perform a linear background subtraction using the background spectrum to the immediate left and right of the Mn peaks. We adjust the background fit channels to give a minimum slope and intercept. Following background subtraction, we fit the residual spectrum in the Mn $K_{\alpha/\beta}$ peak region to the sum of two gaussians. We then use the K_α peak area to compute a calibration constant that can be used to convert Mn K_α count rate for any sample measurement to an absolute Mn surface density. The mass attenuation factor for 6 keV x-rays is 74.2 cm^2 /g (Tertian and Claisse 1982), giving an attenuation length in Mn of approximately 18 μm which is much greater than the film thickness. Therefore, the Mn peak area will be directly proportional to the thickness. Specifically, the surface density of Mn in a sample experiment giving a peak count rate of R_σ is given by: $\sigma = t_0 \rho_0 R_\sigma/R_0$, where t_0= 158 nm = 15.8 x 10^{-6} cm, μ_0 = 7.47 x 10^6 ρg/cm^3, where R_0 is the Mn K_α peak count rate for the thin-film calibration standard and R_σ is the Mn K_α peak count rate for the sample. With the units and values used here, σ will be in μg/cm^2.

Lytle et al. (2009) have measured Mn levels in petroglyphs and have calibrated Mn levels to dates using independent cosmogenic and geological data. Since the published Lytle, et al. calibration curve is not given in absolute manganese densities and is dependent on the experimental details of their equipment and protocols, we cannot use it directly for our measurements. In order to provide a basis for comparison, we provided Dr. Lytle with the same 158 nm Mn thin-film calibration slide used above. For this sample he measured a Mn peak area that would be equivalent to an age of 15,400 years based on his calibration curve. From this information we determine the slope of the Lytle, et al., calibration line to be 130.5 years/ (μg-Mn/cm^2) (Farrell Lytle, personal communication 2009).

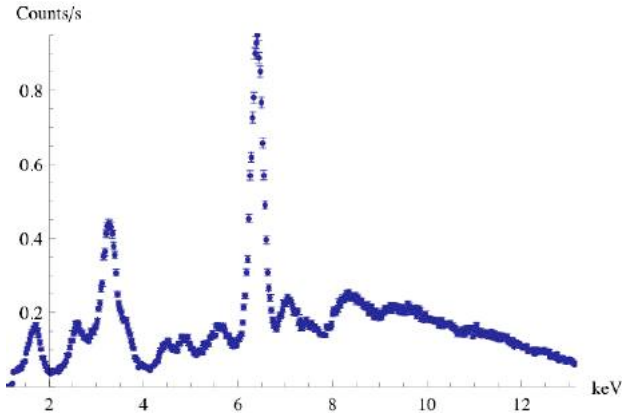


Figure 9. *XRF spectrum of Sand Island base rock. The base rock at the "Dancing Bear" site produced a similar spectrum.*

Base Rock Data

Sand Island Base Rock. The next step in the data analysis is to measure the Mn level in the base rock underlying the desert varnish. While at the Sand Island site, we collected a small (marble-sized) piece of base rock that had spalled from the rock face in the vicinity of the petroglyphs. After returning from the field, we trimmed the sample to ensure no influence of surface contaminants and performed long count-time XRF measurements of the sample.

Figure 9 shows one of our XRF spectra of the Sand Island base rock. We believe the peak at approximately 5.6 keV is due to Samarium which is in the same group of the periodic table as iron. The Sm L_α (L_β) peaks, at 5.64 keV (6.21 keV), are close enough to the Mn peaks to give a false positive Mn result if not accounted for; therefore we fit both the Mn and Sm peaks simultaneously in our analyses. From this analysis of the base rock spectrum described below, we determined that the manganese level in the base rock was consistent with zero, that is, below our detectable limits. On the other hand, as we see from Figure 9, we found a clear Sm peak with a peak height of about 0.04 counts/s with background subtraction (~0.16 counts/s with background).

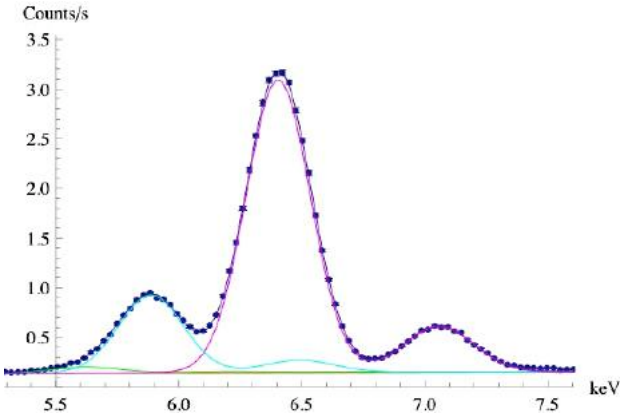


Figure 10. *XRF spectrum of the big-horn sheep petroglyph for sample SI-1963a-b. The above-background contributions for Sm, Mn and Fe are given by green, cyan, and red lines, respectively. The blue line is the sum.*

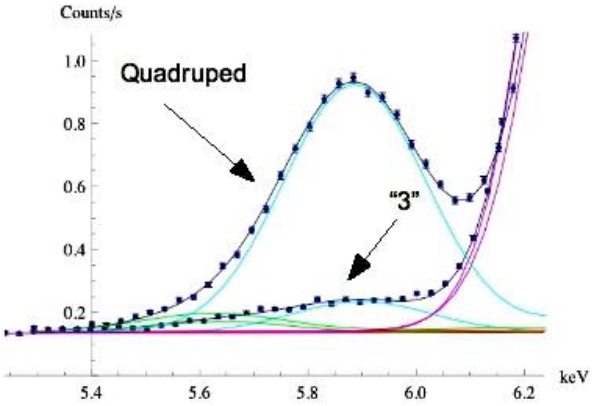


Figure 11. *Close-up of the XRF spectra in the Mn energy region for both the "3" graffito and the quadruped in samples SI-1963a-b. The above-background contributions for Sm, Mn and Fe are given by green, cyan, and red lines, respectively. The blue line is the sum.*

"Dancing Bear" Site Base Rock. In a similar fashion to the procedure followed at Sand Island, while at the "Dancing Bear" site, we collected a small (marble-sized) piece of base rock that had spalled from the rock and made a long measurement in the lab. The XRF spectra of the "Dancing Bear" site base rock was essentially identical to that of Sand Island (Figure 9) including a Samarium peak at about 5.6 keV. Therefore, again we fit both the Mn and Sm peaks simultaneously in our analyses. However, unlike the Sand Island base rock, we found a small residual Mn level of approximately 0.33 +/- 0.13 μg-Mn/cm^2 , close to our detectable limit. In the results presented below, this value is subtracted from the petroglyph/graffiti values to determine the Mn level in the desert varnish alone.

Fitting Procedure

Figure 10 shows an example XRF spectrum in the Mn/Fe energy region for sample SI-1963b ("Big-horn sheep" petroglyph) just above the "3" of the "1963" graffito taken at the Sand Island, Utah, the "3" graffito, sample SI-1963a ("1963"), and the quadruped petroglyph, sample SI-1963-b (see Figure 4). Also shown are our fits to the spectrum broken down by contributions from the various elements analyzed, Sm, Mn, and Fe.

The analysis procedure consists of five steps:

1. Since all spectra taken include dominant Fe peaks, we use these to calibrate the energy. Focusing on the Fe $K_{\alpha,\beta}$ region, we perform a linear background subtraction and then fit the Fe K_α and K_β peaks only using a sum of gaussians. From these fits we calibrate the energy as a function of channel, compute the widths, and the ratio of K_β to K_α.
2. Focusing on the Mn and Sm energy region, after background subtraction, we fit this region to a sum of gaussians with the centroids, widths, and β-to-α peak height ratios determined by the Fe fitting procedure described in step 1. This leaves only the Mn/Sm K_α peak heights to be determined by the data.
3. Since the Mn K_β peak lies under the Fe K_α peak, if the Mn K_α peak height is greater than about 10 percent of the Fe K_α peak, we re-fit the Fe peaks after subtracting the Mn K_β contribution. We find a single iteration is sufficient to produce a stable set of fit parameters.
4. From the Mn K_α peak height and width, using the Mn calibration constant, we determine the Mn

Table 1. *Manganese surface densities and estimated age for Sand Island samples.*

Sample	Mn (μg/cm^2) "Age" (yBP)(Lytle)	χ^2/df		"Age" (yBP) (linear model)
SI-1963a ("3" graffito)	3.17 +/- 0.23	1.4		414
SI-1963b (Big-horn sheep glyph)	25.27 +/- 0.43	1.1	367 +/- 33 (9.1%)	3297
SI-1963c ("1" graffito)	3.05 +/- 0.49	1.3		398
SI-1963d (Lizard glyph)	25.52 +/- 0.87	1.5	385 +/- 75 (19.6%)	3534

Table 2. *Manganese surface densities and estimated age for the "Dancing Bear" site samples.*

Sample	Mn (μg/cm^2) "Age" (yBP)(Lytle)	χ^2/df		"Age" (yBP) (linear model)
DB-1964a "Harley Nelson1964"	2.49 +/- 0.59	1.4		
DB-1964a background patina	52.73 +/- 1.33	2.0		
DB-1964b "Bear paw"	33.23 +/- 0.65	1.4	607 +/- 156	4340
DB-1963c "Lobe head #1"	51.02 +/- 1.6	1.5	931 +/- 251	6660
DB-1964d "Lobe head #2"	51.93 +/- 1.1	1.5	948 +/- 245	6750
DB-1964d background patina	86.57 +/- 1.2	1.6		

surface density as described in the Mn calibration subsection above..

5. For each set of fit parameters we calculated a χ^2 per degree of freedom and by varying the fit parameters around the best fit values determined errors at the 90 percent confidence level (statistical only).

RESULTS

Sand Island samples SI-1963a-b

We carried out the fitting procedure described in Section VI.C. for the measurements of samples SI-1963a-b. In addition, for each case a separate thin-film Mn calibration spectrum was taken to provide the calibration factor needed to convert these count rates to absolute Mn surface density as described in Section VI.A. The results of our analyses for samples SI-1963a-b are given in Table 1.

As seen in Figures 10 and 11, the quality of the fits is excellent with a χ^2 per degree of freedom ranging from 1.–1.5. The errors quoted represent a 90 percent confidence level for the value of the measurement reported. It was initially puzzling that the background patina adjacent to samples SI-1963a-d actually had less Mn (24.2 mg/cm^2) than in the petroglyphs. The puzzle was resolved when a close examination of the background revealed that it had been subjected to high-point abrasion which removed significant amounts of desert varnish resulting in the lower Mn levels.

Dancing Bear Panel samples DB-1964a-d

We carried out the fitting procedure described in Section VI.C. for the measurements of samples DB-1964a-d. In addition, for each case a separate thin-film Mn calibration spectrum was taken to provide the calibration factor needed to convert these count rates to absolute Mn surface density as described in Section VI.A. The results of our analyses for samples DB-1964a-d are given in Table 2 along with estimated ages based on a linear extrapolation from the graffiti compared with the dates using the Lytle et al. calibration.

The background patina on the main panel in the region in the vicinity of the graffiti (sample DB-1964a) had significantly less Mn than that adjacent to sample DB-1964d ("Lobe head #2") behind the main panel. On close examination there appeared to be some abrasion of the back-

ground in the vicinity of the graffiti which could have reduced the Mn level there, but further study is needed.

SUMMARY AND CONCLUSIONS

We have constructed a portable XRF device for field deployment that enables one to count for long periods of time with the goal of detecting low levels of manganese in petroglyphs and graffiti. We used this device to measure Mn levels in petroglyphs and graffiti at Sand Island outside of Bluff, Utah, and at the "Dancing Bear" panel north of Moab, Utah. For the first time, we have measured Mn surface densities in graffiti representing the earliest stages of repatination.

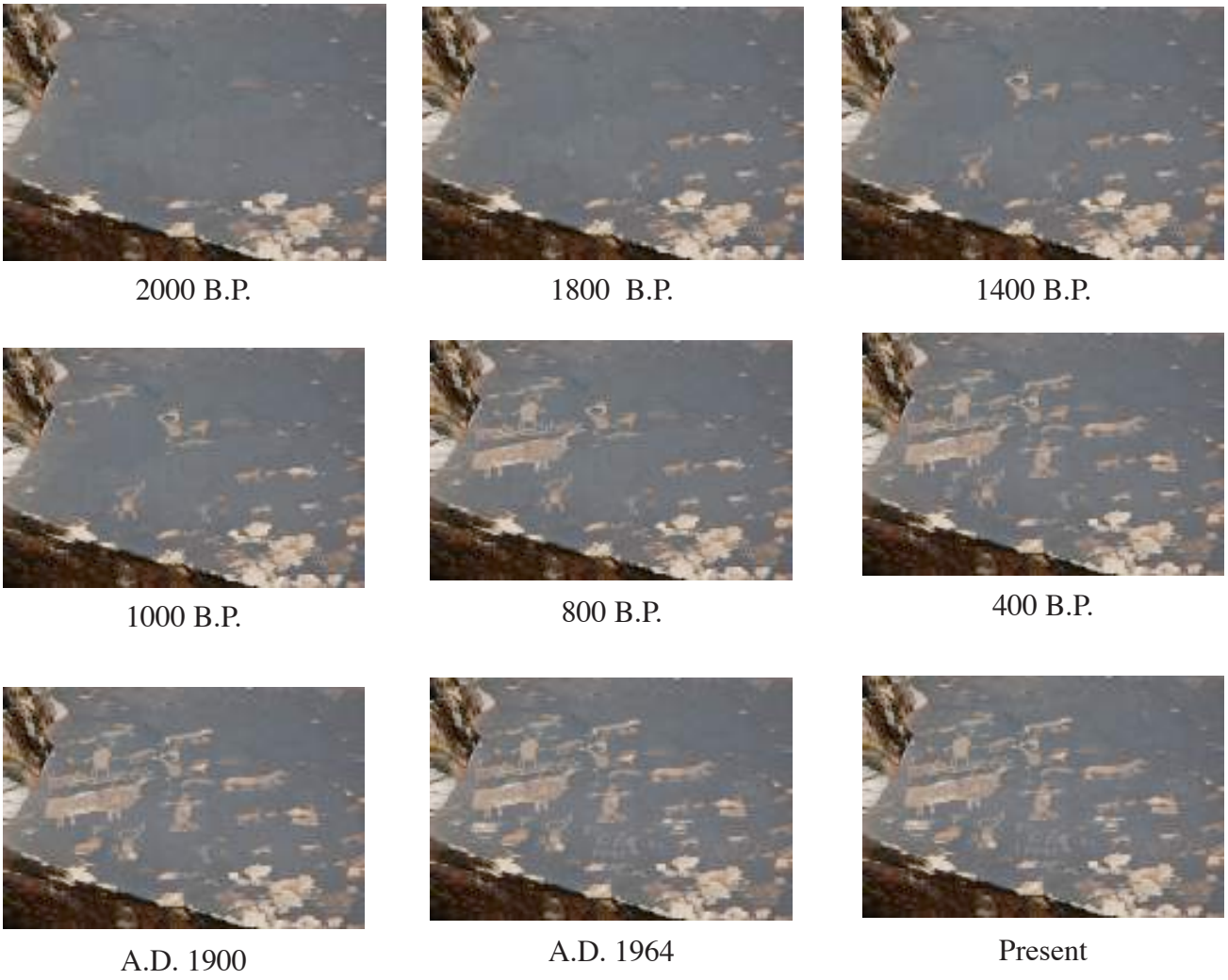
To convert the measured manganese levels to an age requires a model of how the manganese accumulates as a function of time. The simplest model is to take a linear accumulation rate as assumed by Lytle et al. For the Sand Island samples, SI-1963a-d, we determined that about 3.1 $\mu g/cm^2$ of Mn has accumulated in the "1963" graffito since its creation giving a Mn accumulation rate of 0.076 $\mu g/cm^2$ per year or, equivalently stated, it takes 14.8 years to accumulate one $\mu g/cm^2$ of Mn. For the "Dancing Bear" site samples, DB-1964a-d, we determined that about 2.5 $\mu g/cm^2$ of Mn has accumulated in the "1964" graffito since its creation giving a Mn accumulation rate of 0.056 mg/cm^2 per year (18 years to accumulate one $\mu g/cm^2$ of Mn). Both of these Mn accumulation rates are significantly greater than those reported by Lytle et al. who find a Mn accumulation rate of only 0.0077 $\mu g/cm^2$ per year (or, 130 years to accumulate one $\mu g/cm^2$ of Mn). Resolving the discrepancy with the Lytle et al. calibration will require cross calibrating the same sources.

Based on the Mn measurement in the petroglyphs at each site, *assuming* a linear model for Mn accumulation, we calculate an age of 367 +/- 33 (9.1%) years for the lizard petroglyph, sample SI-1963d, shown in Figure 5. However, if this is indeed a Pueblo I or II style petroglyph based on its subject and style, we would expect an age of around 900 to 1300 years, (Cole 2009). Likewise, we find an age of 385 +/- 75 (19.6%) years for sample SI-1963b, the big-horn sheep petroglyph shown in Figure 4. If we believe this petroglyph to be Archaic based on its subject and style, we would expect a much older age, perhaps as old as 3000–4000 years, (Cole 2009), and closer to the Lytle et al. values.

Similarly, for the "Dancing Bear" site, based on the linear accumulation model, sample DB-1964b, the age of the "bear paw" petroglyph is found to be approximately 607 +/- 156 years B.P. Similarly, the age of sample DB-1964-c, "lobe head#1" petroglyph is found to be 931 +/- 251 years B.P. The age of sample DB-1964d, the "lobe head#2" petroglyph (behind the main panel) is found to be 948 +/- 245 years B.P. With the significant discrepancy between the calculated dates based on Mn levels and that based on style, we suspect that the linear accumulation model, at least for the time spans covered in this study, may be too simplistic. It is encouraging that the two "lobe head" figures are measured to have approximately the same Mn levels although in different locations and orientations. The Mn accumulation history is apparently similar for both rock faces even though the background patina provided different Mn levels probably due to abrasion of the patina on the front panel.

We further note that the Mn levels for the two Sand Island graffiti are nearly the same to within experimental error even though they are on different regions of the rock which showed some variation in patination. This may not be surprising; however we also note that the two petroglyphs, supposedly of different ages based on the styles, also have approximately the same level of Mn. This observation suggests that perhaps there may be a rate-limiting factor in desert varnish accumulation providing further suggestion that the Mn accumulation may not be linear. It is hoped that this work will stimulate further investigation

Table 3. *Simulated time-lapse sequence for the "Dancing Bear" site near Moab, Utah, illustrating the potential for relative dating using XRF.*



leading to a more sophisticated mathematical model for Mn accumulation rates. To constrain a nonlinear Mn accumulation model, it will be necessary to obtain more than one independently dated glyph. This will be the challenging subject of future work.

Finally, while absolute date calibration continues to present a challenge, the possibility of using Mn measurements to determine relative ages may still prove useful. By measuring the Mn level in each petroglyph of a site of multiple settlements over time, it may be possible to estimate the relative ages of the petroglyphs allowing one to create a time-lapse movie of the petroglyph site. Table 3 displays a *simulation* of a time-lapse of the "Dancing Bear" panel based upon hypothetical Mn levels.

Acknowledgements. We thank Winston Hurst for inviting us to conduct the study of petroglyphs in the Bluff, Utah, area, providing archaeological oversight of the project, showing us several candidate sites, and for partial support through the Comb Ridge Heritage Initiative Project, University of Colorado under contract to the BLM (Catherine M. Cameron, Principal Investigator). We thank Laura Kochanski of the Monticello BLM Field Office and Leigh Grench of the Moab BLM Field Office for permission to perform the

experiments, Joseph Beach for creating our Mn calibration target, Farrel Lytle for independent measurements of the Mn thin-film target, F. Edward Cecil for collaborations and assistance in the work at Sand Island, and Lynda McNeil for assisting with logistics and providing valuable background on the rock art of the region.

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Bernard M. Jones, Jr.

ANTHROPOMORPHIZED CROOKED STAFFS

CROOKED STAFF BACKGROUND INFORMATION

Visual symbols of crooked staffs are found in a wide variety of size, shape, and length (Figure 1). They can be placed vertically, horizontally, diagonally and/or upside down within rock art panels (Figure 2). In the literature, these objects have been termed crooked staffs, crooked wands, crooked sticks, crooked prayer sticks, crooked canes, and canes. To date 25 cultural names for crooks or crooked staffs have been recorded.

Crooked staff symbolism has what Eliade termed multi-variant or deeply layered meanings (Eliade 1991:15). For instance, a crooked staff may be a tool used by shepherds to control sheep or as a support device for older people. On another level, crooks have manifest as well as spiritual symbolism. This duality is displayed using a wide variety of methods. In this example, the two manifest crooked staffs are displayed in a juxtaposed fashion (Figure 3). Their concomitant spirit or supernatural aspects are presented as lightly pecked, almost effluvium-like, emanations of crook images.

Figure 1. *Inscription Point, Arizona. Thick staffs.*

Figure 2. *Hummingbird Point, Gila River, Arizona. An upside-down crook image.*

Figure 3. *Picacho Mountains, Arizona. Note the ghost-like spiritual crook forms moving up and away from the dual manifest crook images.*

Figure 4. *Inscription Point, Arizona. An anthropomorph holding a crooked staff.*

When a manifest crooked staff is carried by a priest or shaman it can become a symbol of authority (Figure 4).

In certain cultures an opening or crack in a rock's surface is considered a pathway or opening into the supernatural. Likewise, crooked staffs can generate a passageway from the human lived world into the supernatural. In some societies the crook itself is the "road" over which spirits travel (Parsons 1996:198, 280, 569).

In many Native American cultures crooked staffs are metaphors representing and substantiating the underlying quintessential essence of all things. This essence is characterized as an invisible, magical, omnipotent substructure permeating all things, while giving them life and movement. Words used to describe these phenomena vary from culture to culture. However, most of these descriptors can be loosely translated as medicine, supernatural power or simply power (Eliade 1996:19–23; Hultkrantz 1976:9–14).

The omnipresent, moving aspects of power are seen as swirling inseparable, interconnected energy patterns which could be called powerscapes. It is in this numinous world of power that spirits of all types exist. Observation of ever changing energy patterns generated by the movement of power compelled visionaries throughout Native America to illustrate these extraordinary phenomena using a very similar series of linear devices and patterned motifs. Arrays of sinuous lines and patterned shapes are observed in many North American rock art styles and other cultural materials. Sinuous lines, snaking from crook configurations, radiating from spirit and other forms are displays of symbolic numinous energy. This power symbolism has been variously described as representing life energy, force lines, power lines, or tigunas (Figure 5).

When manifest crooked staffs are imbued with power, they become numens capable of accomplishing fantastic feats. Native American mythologies tell of crooked staffs in the hands of cultural heroes, gods, and shamans, blasting a tunnel through a mountain, parting the waters of an ocean, and bringing the dead back to life.

Figure 5. *Little Black Mountain, Arizona Strip, Arizona. A crooked staff is displaying power imagery. Note the power or energy lines moving from the crook.*

Other stories of their exploits abound (Bahr 1994:212; Laird 1976:196, 1984:37).

Anthropomorphized Crooks

Fragments of unique ethnography, oral tradition and mythology from a number of cultures appear to have similar connotations that are replicated in rock art. Isabel Kelly and Carobeth Laird, working forty years apart, with separate bands of the Chemehuevi people, recorded parallel ethnographies. The stories collected tell of crooked staffs speaking to their owners who, of course, were shaman. Crook staffs in their spirit form are described as giving instructions to dreamers. Finally, it was thought that certain crooked staffs had lives of their own (Kelly 1936:132; Laird 1976:49, 216).

Corresponding tales in the Pima creation narratives also anthropomorphize crooks. For instance the mythic Earth Doctor's cane had "eyes on it just like a person." During its adventures it is described as "looking around." In one of the stories its owner uses his crook to vault into the sky and fly with it to his designation (Bahr 1994:72, 240, 241).

Leslie White's 1930s research at the Acoma Pueblo revealed that prayer sticks in the form of a shepherd's crook, are felt to be animate (White 1930:126). At both Acoma and Jemez Pueblos many prayer sticks have eyes and a mouth, while their colors identify them as being male or female. Elsie Parson's 1920's research at Jemez Pueblo discovered that prayer sticks bound together with crooks were both male and female (Parsons 1925:100–101, Figure a and b).

A number of rock art panels scattered throughout the American west provide visual confirmation that these oral traditions, myths, and cultural thought processes were transmitted, understood, and illustrated over time and distance. An amazingly similar pattern of crook symbolism depicting crooked staff motifs having anthropomorphic legs, feet, arms, and heads is

Figure 6. *Picacho Mountains, Arizona.*

widespread. Many of these petroglyphs give the impression that these anthropomorphized crooks are indeed carefree and moving about pursuing "a life of their own."

A fine example of the anthropomorphized crook motif created by the O'odham people can be found in the Picacho Mountains, located in the desert of southern Arizona. This animated petroglyph's head is the staff's crook (Figure 6). Arms and a leg have been added to complete the figure. The anthropomorphized crook figure appears to be sauntering through a segment of the highly-spirited supernatural world surrounded by other crook imagery. Compare this image to Figure 7 a., b., c., and f.

The canyons of southeastern Utah have a number of anthropomorphized crook figures as part of involved petroglyph panels. Like the figure in Arizona's Picacho Mountains, an Anasazi figuration (Figure 7a) just as his Arizona O'odham counterpart, affects a relaxed, unconcerned manner. His head is turned casually to the left as if he is looking over his shoulder. His arms are carried in a parity of today's comic book tough guy characters. The feet of this figure are executed in detail and illustrate nicely the spirit crook's forward motion.

In this detail (Figure 7b), the anthropomorphized crook figure appears to be alarmed. It seems to have jumped back from an object to its left. The

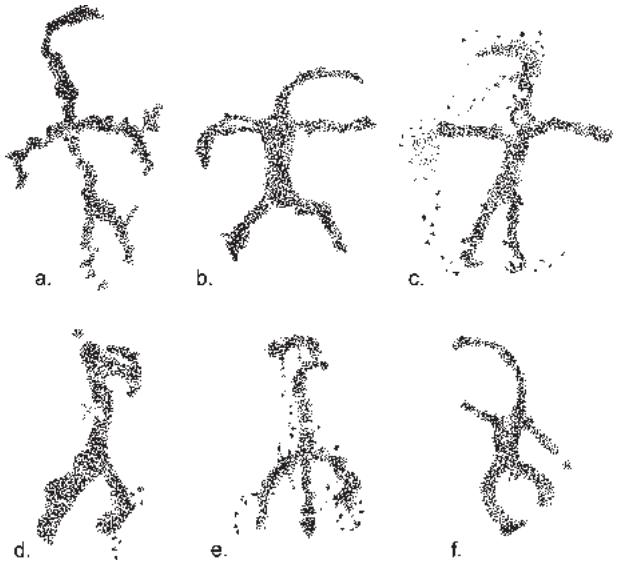

Figure 7. *a. Southeastern Utah; b. San Juan County, Utah; c. Butler Wash, Utah; d. Little Black Mountain, Arizona; e. Rochester Creek, Utah; f. Mill Creek, Utah.*

crook keeps a close watch as he assumes a classic, broad legged stance, with outthrust arm to fend off unknown advances.

A small anthropomorphized crook is found as part of a large, Basketmaker II and III petroglyph panel (Figure 7c). This figure is looking to his right. His feet are turned inward. His arms are outstretched in what may be a welcoming gesture.

Another small anthropomorphized crook, located in the Arizona Strip, was likely created by the Virgin Anasazi culture. It is found on a tumbled down boulder with only a few other images (Figure 7d).

A legged crook is also found in the lower right quadrant of the famous Rochester Creek panel. This beautifully interrelated panel is attributed to the Fremont and other cultures (Figure 7e).

An anthropomorphized crook, with a sauntering posture, is part of a rock art panel found in Mill Creek, Utah (Figure 7f).

Figure 8. *Upper Pima Canyon, South Mountain, Arizona.*

The South Mountains of Arizona shelters a unique dance scene (Figure 8). In this detail, a Hohokam adept cunningly crafted a rock art panel in which a crooked staff, displaying its spirit power, leads a group of dancers. The dancers and crooked staff are heavily pecked into the rock. The apparitional arm, leg, and crooked staff displayed by the spirit crook are lightly scratched using simple lines, furnishing the visual paradox necessary to render the crook a spirit dancer.

Unique among these motifs is a petroglyph grouping found near a beautiful perennial spring in John's Canyon, Utah. The spirit crook has underpinnings of feet. The legged crook's association with two other individuals and a legged staff, perhaps in dance, implies a supernatural camaraderie (Figure 9).

Figure 9. *John's Canyon, Utah. Photo, Chris Rhodes.*

Figure 10. *Butler Wash, Utah. Photo, Chris Rhodes*

An extraordinary example of this mythic reflection is a petroglyph of a spirit figure on a journey, carrying a burden basket, with a casually suspended tump line (Figure 10). This figuration is rendered with a full sized crooked staff thrust in front of its body. The tilt of the staff and body, plus an additional "leg," provides the illusion of forward motion. Perhaps the crooked spirit is traveling or is being pulled in an occult manner with the crooked staff being both the mode of travel and numinous pathway.

Like the more masterfully pecked figure in Butler Wash, this smaller delineation is also holding its own crooked staff (Figure 11). He is grasping the staff as figures of power do; a firm two-handed grip, with the arms locked and the crooked segment of the staff situated away from the body. However, the position of this crooked staff is rare, perhaps unique. In most occurrences the crook

Figure 11. *Wolf Man Site, near Butler Wash, Utah.*

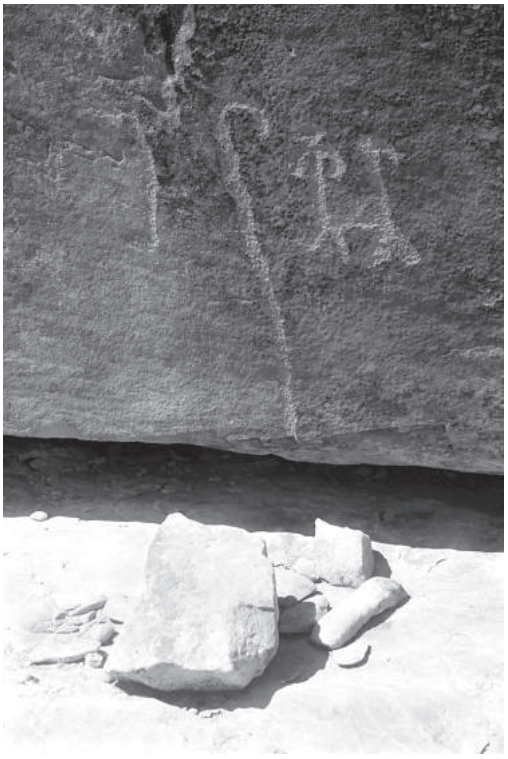

Figure 12. *Upper Step Canyon. Photo, Chris Rhodes.*

portion of the staff is shown pointing away from its proprietor. This image has additional peculiarities. It appears to have a developed body draped with clothing.

This cluster of petroglyphs (Figure 12) includes one and possibly two crooked staffs. Two anthropomorphs are located below and to the right

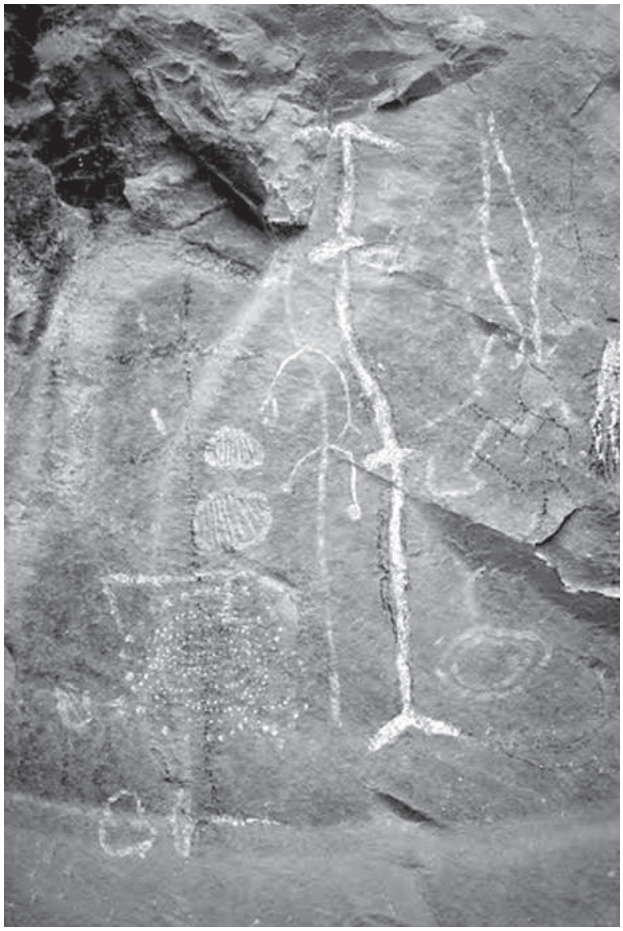

Figure 13. *Rock Shelter within the Esplanade, Grand Canyon, Arizona. Photo, Chris Rhodes.*

of the larger staff's crook. It has been suggested that these figures are engaged in copulation and that the crook(s) are part of fertility symbolism. While there is interaction between these figures, based on the graphic nature of rock art depicting the sex act, it is not clear that these figures are engaged in an act of sexual intercourse. Closer examination reveals that the figure on the right is, in fact, an anthropomorphized crook supporting a hominine head or headdress of some sort. An alternate sub-text of this panel may suggest an intimate spiritual connection with the supernatural. Perhaps the supposed phallus is a symbolic "road" over which the anthropomorphic crook is traveling to reach its owner.

The anthropomorphized crook phenomenon is also found in painted form (Figure 13). This tall, thin slightly swaying legged crook is painted in white and outlined using a rich red/brown pigment. Its stubby legs are similar to the legs on the crooked figure found in Upper Step Canyon. The style of this panel is likely Archaic. Certain Pueblos paint their crooks. For instance, at Cochiti the lower end of the crooked staff is painted in the cardinal colors of this group (Goldfrank 1927:54). Two cob-like masses bisect the crook's body. These shapes may represent spiritual aspects of corn. A power line issues from the lower corn-like mass and touches a number of figures in an elaborate painted composition to its right. At Hopi, the chief Powamu priest carries a long crooked staff with corn and other ritual objects tied to its center (Voth 1901:Plate LVIII). Perhaps the anthropomorphized crook in this painting is participating in a spiritual ceremony.

The hand that crafted the pecked cluster of glyphs in Figure 14, positioned a legged crook, expelling power imagery from its tip, above a natural concavity. The spirit crook form appears to drift

Figure 14. *Picacho Mountains, Arizona.*

Figure 15. *Sand Island, Utah.*

from this vent-like opening into the embrace of a classic manifest crooked staff. This panel may illustrate the arrival of a spirit crook from the numinous. Using magical mobility, it comes forth to imbue an incarnate crook staff with power.

The huge and intricately involved petroglyph panel at Sand Island is home to a powerfully energetic legged crook (Figure 15). Located next to a powerful shamanic figure, the anthropomorphized crook's power lines spawn energy paths that connect with many of the major elements of this panel. Close examination reveals that most images on this panel are interconnected, juxtaposed, or joined in some fashion. Spiritual adepts report "seeing" these collective, ever-changing powerscapes of the spirit where shimmering lines seem to pass through translucent forms and connect all things.

A legged crook with distinctive form has been rendered replete with an elaborate headdress. This image is a major component of a beautifully worked assemblage of petroglyphs (Figure 16). The headdress may indicate an individual with a high rank or shamanic abilities within the society that created the petroglyph panel, likely Fremont. The cluster of finely pecked stipple marks issuing from the crook's "mouth" is reminiscent of the

Figure 16. *San Rafael Reef, Utah. Photo, Chris Rhodes.*

Pueblo's spiritual breath-of-life imagery. The etherealized snakes, crosses, stars, sets of dots, and abstracted shapes of the panel give a nod toward shamanic activity or images viewed in altered states.

A legged crook, with a feather in its "hair," hovers over a complex petroglyph panel at the Riverview site (Figure 17), near Bishop, California. This spirit crook, likely created by the ancestral Owens Valley Paiute people, is placed above a shallow, pecked, cup-like depression. This cup has been situated over intersecting cracks in the rock's face. These narrow apertures and cup indicate a nexus from which the crook spirit has flown. The

Figure 17. *Riverview site, Owens Valley, California.*

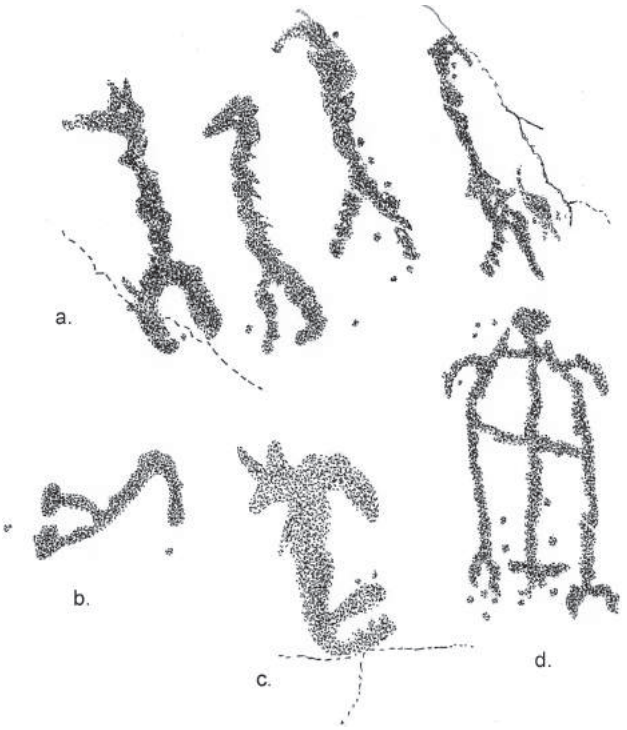

Figure 18. *a. Comb Ridge, Utah; b. Painted Desert, Arizona; c. Whitney Pockets, Nevada; d. Newspaper Rock, Utah..*

intricate petroglyph panel located below the "flying" crook form is certainly a powerscape. Note the crooked staff placed in the center of the powerscape composition.

There are many interpretations of the Procession Panel. It certainly has its share of powerful shamanic figures carrying crooked staffs. A segment of the procession figures may illustrate anthropomorphized crooks (Figure 18a). A number of these figures appear to have eyes. As with others of its kind, this grouping of crooks displays a carefree physical attitude. They walk as in a group of friends, staggered, curious, and with an unhurried gait. One of the group looks over its shoulder and peers into a crack in the rock. The crack in the rock and the strike marks, forming a dotted pattern among the figures, suggests supernatural attachments.

A floating legged crook appears to hover near the top of a boulder in the Painted Desert (Figure 18b). The balled feet of this legged image are similar

Figure 19. *Long Lake, Oregon.*

to the feet of the flying crook at the Riverview site.

A legged crook image at Whitney Pockets (Figure 18c), gives the impression of relaxing and is engaging in the very human inactivity of sitting. Like a number of other anthropomorphized crooks this figure is connected to a long crack in the rock. This character is also wearing what may be head gear or a feather bundle at the back of its "head".

A notable variation of the spirit crook motif, involves two bandy-legged crooked staffs giving the appearance of transporting an elongated personage (Figure 18d). This petroglyph grouping provides a visual metaphor of a shaman, in trance, grasping the crook portions of each anthropomorphized staff and being held aloft by power lines connecting him to both legged assistants. He passes through time and space along an esoteric thoroughfare of the supernatural.

A legged crook form emerges from a layered, transparent powerscape created on a boulder at Long Lake (Figure 19). The body tapers to a small crook at the apex of the staff. Its arms, opened wide, are reminiscent of the welcoming gesture

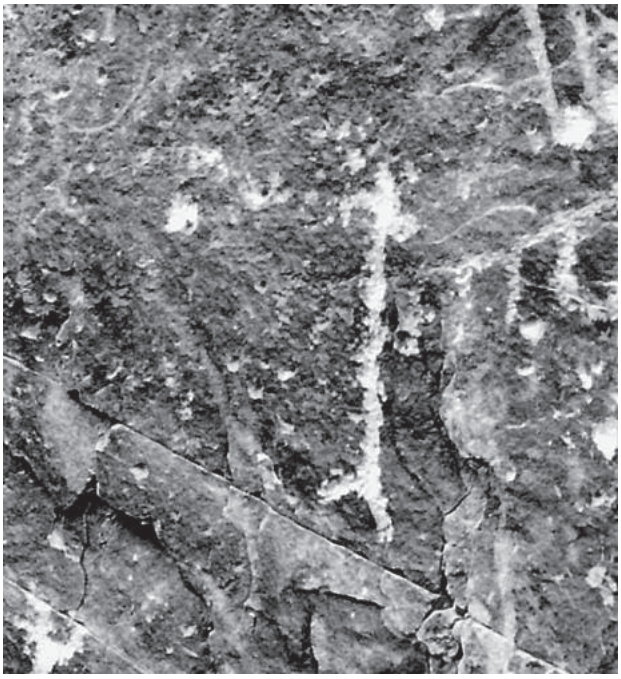

Figure 20. *Hieroglyphic Canyon, Arizona.*

of the figure at Butler Wash in Utah. One arm of this figure touches a major opening in the rock.

Heiroglyphic Canyon (Figure 20) is on private land near Joseph City, Arizona. A relatively small canyon contains a wealth of spectacular Basketmaker images and rock art from later cultures. The legged crook appears here as a somewhat later addition to the rock art of this panel. Again, the figure gives the impression of walking through the scene without a care. It is moving up the face of the rock above a crack in its surface. The nearness of the crack and the circular dot pattern surrounding the figure may suggest numinous activity. This crook figure may have hair. The shapes at the top of the crook could be hair pulled into a roll at the back of the "head." The figure may also be wearing headgear or the shape at the top of the crook could be another part of its hair statement.

An uncommon and striking example of the legged crook phenomenon occurs in the Black Mountains of Arizona (Figure 21). Experienced Chemehuevi or Walapai hands created the illusion of an excited spirit crook jumping out of the supernatural through a crack in the rock. The head, body, legs,

Figure 21. *Warm Springs, Arizona.*

and feet of this spirit form are symbolic and use double crooks in close proximity to form the spirit shape.

CONCLUSIONS

Anthropomorphized crooks not only have human characteristics, but many have what appears to be body ornamentation; they wear or carry important ceremonial paraphernalia and seem to be involved in ritual dance or ceremony. Often they are associated with abstract or dot-like patterns, openings, or cracks in the rock faces suggesting interaction with or movement to and from the supernatural. Most of these figures seem animated and give the impression of "having a life of their own."

The physical distance between sites displaying anthropomorphized crooks is amazing. The distance between the Long Lake site in Oregon and the Picacho Mountains in Arizona is nearly 800 miles. Perhaps the most fascinating aspect of this phenomenon is that anthropomorphized crooks were created in nine separate cultures: the Archaic, Basketmaker, Anasazi, Fremont, Hohokam, O'odham, ancestral Northern Paiute, Paiute and Chemehuevi. A conservative time span of 1,600 years separates the creation of the Archaic

anthropomorphic crook images presented in this paper from the making of the O'odham, Paiute or Chemehuevi symbolic figures. These figures obviously played a universal, cross cultural role in these cultures' mythologies, oral traditions, and rock art practices.

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Steven J. Waller

VOICES CARRY: WHISPER GALLERIES AND X-RATED ECHO MYTHS OF UTAH

Be careful what you say in the canyons of Utah! Acoustic experiments at many rock art sites have revealed that petroglyphs and pictographs are typically located at places with unusually strong sound reflection (Waller 2005). Indeed, petroglyphs were recently discovered in Arch Canyon, Utah, via echolocation (Allan and Waller 2010). Examples are given of rock art sites at which voices carry for unexpectedly long distances, giving rise to whisper galleries and other echo focusing effects. Such complex auditory phenomena were considered to have supernatural causes, and echo spirits were believed to dwell within the rocks. Great Basin mythology will be presented that includes tales of echo spirits in which sexual content is integral to the storyline.

In the process of conducting archaeoacoustic recording experiments to document the relationship between sound reflection and rock art, the author has often experienced the exasperation of interfering background noises that seem particularly magnified at these sites. Voices carry at rock art sites for unexpectedly long distances—a phenomenon known as a whisper gallery effect due to sound focusing. While such conditions may not make it easy for isolating and recording the pure echo effects at a given location, the phenomenon of the whisper gallery effect is interesting in itself, and deserves attention as it may also have contributed to the motivation for the placement of rock art.

Sabine (1922:255–276) described the following six world-famous whispering galleries that continue to be tourist attraction marvels even in the twenty-first century:

1) The Dome of St. Paul's Cathedral in London, first considered scientifically by Sir John Herschel, who stated that "the faintest sound is faithfully conveyed from one side to the other of the dome, but is not heard at any intermediate point" (Sabine 1922:272).

2) Statuary Hall in the Capitol at Washington, D.C. "The visitor to the gallery was placed at the center of curvature of the ceiling and told to whisper, when the slightest sounds were returned to him from the ceiling. The effect was much more striking than one would suppose from this simple description. The slight lapse of time required for the sound to travel to the ceiling and back, together with one's keen sense of direction, gave the effect of an invisible and mocking presence. Or the guide would place the tourists at symmetrical points on either side of the center, where they could, with the help of the ceiling, whisper to each other across distances over which they could not be heard directly" (Sabine 1922:257).

3) The vases in the Salle des Cariatides in the Louvre in Paris (Sabine 1922:269–270).

4) St. John Lateran in Rome (Sabine 1922:266–268).

5) The Ear of Dionysius at Syracuse in Sicily (Sabine 1922:274–276). As described centuries ago by Swinburne (1790:104–107), "It is 18 feet wide and 58 high, and runs into the heart of the hill, in the form of a capital S; the sides are chiseled very smooth, and the roof covered, gradually narrowing almost to as sharp a

> point as a Gothic arch; along this point runs a groove, or channel, which served, as is supposed, to collect the sounds that rose from the speakers below, and convey them to a pipe in a small double cell above, where they were heard with the greatest distinctness... The echo at the mouth of the grotto is very loud; the tearing of a piece of paper made as great a noise as a smart blow of a cudgel on a board would have done; a gun gave a report like thunder that vibrated for some seconds...".
>
> 6) The Cathedral of Girgenti [Agrigento] (Sicily), where "the slightest whisper is borne with perfect distinctness from the great western floor to the cornice behind the high altar, a distance of 250 feet. By a most unlucky coincidence the precise focus of divergence at the former station was chosen for the place of the confessional. Secrets never intended for the public ear thus became known, to the dismay of the confessor and the scandal of the people" (Sabine 1922:264–266; see also New York Catholic Protectory 1873 for a similar description).

Whisper gallery effects are due to the reflection of sound from surfaces with low absorption, together with a spatial shape that focuses the sound waves at a distant location, as well as contributions from refraction and diffraction, such that the sound waves are stronger than the direct waves would be expected to be. Echoes are such a complex auditory phenomena that they were considered supernatural, and were explained by echo spirits dwelling within the rocks.

This article includes examples of rock art sites located in whisper galleries, and will put sound reflection into cultural perspective by presenting examples of Great Basin echo mythology in which sexual content is integral to the storyline. Descriptions of the characters in these echo myths relate to rock art subject matter, which can often be graphically sexual in content. This is consistent with the scientifically testable Rock Art Acoustics theory that rock art locations and subject matter both relate to the auditory sense.

WHISPER GALLERIES IN UTAH

Sound was experienced as carrying unusually far due to sound reflection, giving notable whisper gallery effects, at the following sites tested in Utah in 2009:

Anasazi Ridge
Black Point
Bock's Canyon
Parowan Gap East
Parowan Gap Narrows

To give one specific example, at Bock's Canyon, when I was high up on a canyon wall at the panel depicted in Figure 1, I could distinctly hear every word of a personal conversation between a married couple far below at the spiral design in the bottom of the canyon. It would be worth the

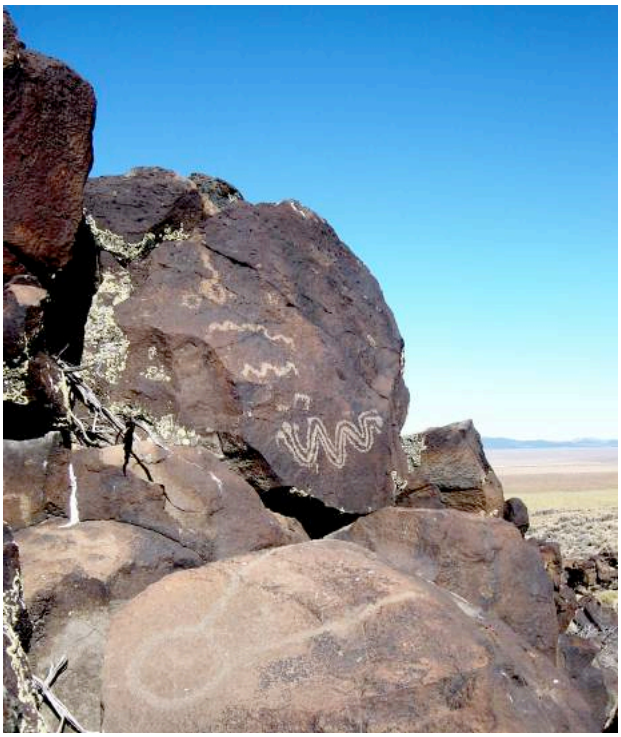

Figure 1. *Bock's Canyon, Utah. An example of a rock art site with remarkable whisper gallery effects.*

considerable effort of designing and carrying out an experiment to quantitatively measure and document the extraordinary sound propagation at such rock art sites as contrasted and compared to ordinary flat terrain.

GREAT BASIN ECHO MYTHOLOGY

The cultural significance of sound reflection is underscored by the numerous echo myths from around the world that contain supernatural explanations of echoes. A few of these myths are paraphrased below. It is interesting that sexual content is integral to these echo myths, which are included here since they go hand-in-hand with the whispering gallery theme of this paper.

"First Tale" (Hopi)

"In the Beginning there were only two: Tawa, the Sun God, and Spider Woman, the Earth Goddess... They were the first lovers and of their union there came into being those marvelous ones the Magic Twins—Puukonhoya, the Youth, and Palunhoya, the Echo" (Mullett 1979:1). (See also Waller 2006 regarding acoustic testing to substantiate interpretations of possible depictions of the Divine Echo Twin at echoing rock art sites)

"Wind Woman Became Echo" (Chemehuevi)

"Wind Woman imitates Dove's voice; steals her boy; Dove's son becomes a young man; Wind Woman makes him to copulate with her so often that his penis becomes large and heavy; four girls who are his cousins reduce his penis to normal size; Archer hides him; lures Wind Woman into cave, closes it; she became the Echo" (Laird 1976:158–159).

"Tso'apittse" (Shoshone)

One woman had a baby, a baby boy.
Tso'apittse said "Give me that little boy. I want to hold him. I want to pet the baby."
She stole the baby.
The boy grew bigger.
Tso'apittse kept pulling the boy's penis.
It grows long.
Then the boy is grown, and Tso'apittse marries him.
Every time Tso'apittse comes home she wanted to have intercourse with him.
She says "Come now, take out your penis."
The boy is a man now.
He goes to hunt mountain sheep.
A man he meets gives the boy a mountain sheep to eat; makes fire.
The boy gives the mountain sheep heart to Tso'apittse.
She hits the ground with it all night.
Tso'apittse goes to get the meat; wishes for wind, gets the meat, runs home, finds boy is gone.
He meets a woman gathering seeds for food.
The woman hides him in her gathering basket.
Tso'apittse comes and says "Where's my man?"
The woman says "I haven't seen him."
Tso'apittse says, "Look that little basket is crooked."
The boy gets out and runs away; meets Coyote hunting jackrabbits.
Tso'apittse comes and says to Coyote "Where is my man?"
Coyote is making an arrow.
Tso'apittse looks the other way.
Coyote takes the boy out of the butt of the arrow.
Boy runs away.
A bird who lives on top of the rocks hides the boy.
The bird is going to make an arrow. He has a stone pestle and puts it between his legs so that it looks like a penis.
Tso'apittse looks at the bird, sees what she thinks is a penis and says "I want that."
The bird says "All right, I'll give it to you."
This bird had a cave for a house
He says, "Come, let's go into the cave."

So he and Tso'apittse go into the cave and he gives it to Tso'apittse.
The cave begins to get small and Tso'apittse says, "What is happening to the cave?"
The bird says, "When I have intercourse with my wife, the cave always does this."
Then the cave got smaller and smaller and the little bird got out the tiny hole that was left.
When he gets out, the entrance shuts up tight.
The bird saw the boy's long penis and said, "That's no good, let's cut it off."
So he cut it off.
Tso'apittse became echo.
(Smith 1939:137–139)

CONCLUSIONS

In conclusion, be careful what you say in the canyons of Utah. Rock art locations are typically echo rich, and voices carry. The subject matter of rock art is consistent with descriptions of characters described in echo myths, including ithyphallic anthropomorphs (Figure 2). Thus, to people who were familiar with the stories of sexually obsessed echo spirits presented above, the large penis could have been an image that immediately sprang to mind upon hearing echoes. The phallus thus also would have been an easy way to represent and evoke the echo story to the viewer, and thus could have been a symbol for the echoes heard at rock art sites.

The sexual content of echo myths, together with the sexually graphic or sexually symbolic content of rock art seems to be revealing of the psychological thought processes of ancient humans.

The author speculates that auditory illusions of depth (see Waller and Arsenault 2008) may have led to myths of penetrating through the rock surface, which in turn may have been linked in the brain to thoughts of sexual penetration. It is interesting to note the frequency with which echo myths have a sexual connection. The very first sex act, according to Hopi tradition, resulted in the conception of the Echo Twin. Parallel to the Great Basin myths presented above, the very reason the mythical Greek nymph Echo was punished and became the echo spirit was because of sex: first she distracted Hera's attention away from Jupiter's sexual philanderings, and later she pined away due to unrequited lust for Narcissus until her bones turned to stone. Perhaps also the rhythmic answers of echoes to clapping or drumming triggered a dance response, with associated thought patterns of the rhythmic motions characteristic of coitus.

Although the paragraph above contains unprovable speculations, the theory that echoes and related sound phenomena were a motive for

Figure 2. *Ithyphallic anthropomorph design from an echoing rock art site in Mesa Verde that could symbolize the echo spirit described in Great Basin myths as being obsessed with penises.*

rock art placement and subject matter is scientifically testable by acoustic techniques, and has been substantiated by formal methods of data collection. It is furthermore supported by informed methods since ethnographically documented echo myths reveal the cultural significance of sound reflection. Implications of these research results include the need for conserving the natural soundscapes of rock art sites.

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Galal Gough

LIGHTNING AND NATIVE AMERICAN ROCK ART

Lightning is a powerful symbol in Native American Rock Art, associated with clouds and rain. It is also related to powerful beings and with creation stories, rituals, and songs of lightning and thunder (Patterson-Rudolph 1997:73, 86, 99). Carobeth Laird, in her landmark book on the Chemehuevis, gives a dynamic description of storm and lightning (Figure 1):

> When there is a storm in the desert, thunder rumbles and crashes; beneath dark clouds the rain thrusts forward like an advancing army, accompanied by the glare and crackle of lightning; while away from the immediate center of the storm, rainbows arch over valleys or hang their transparent arcs of glory across rugged cliffs. This is the tremendous spectacle dramatized by the Chemehuevis in the great...tale of 'How Wolf and Coyote went Away,' which is replete with glorious weather symbolism.... [Laird 1976:98, 99].

In *Where the Lightning Strikes*, Peter Nabokov writes:

> Also in the landscape lay powers for the mind and spirit, especially on nights slashed by lightning, when medicine makers sought it face-to-face....For the Cherokee, lightning was a positive power. Trees struck by it (Figure 2) were sought after so that shamans could bury their blackened splinters in the cornfields to assure healthy crops. Warriors and ballplayers rubbed the charred wood on their biceps and calves for strength. Everyone knew they were charged with 'You, Ancient Ones,' bolts of sacred fire from the sky [Nabokov 2006:55–56].

In 1992, Ken Hedges, then Curator at the San Diego Museum of Man, took a group of us to Sears Point along the Gila River in Arizona. At the western edge of the main Sears Point mesa, he pointed out the lightning strike petroglyph and the lightning caused scar. My wife held a compass by the cliff face (Figure 3), and the magnetic alteration made by the lightning caused the compass to react. Farther up river, at the Painted Rocks petroglyph site, the split boulder on top (Figure 4), according to the campground host,

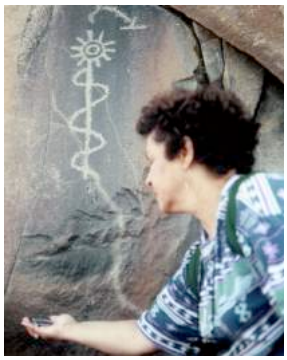

Figure 3. *Sears Point lightning strike.*

Figure 1. *Desert lightning storm.*

Figure 2. *Lightning struck tree.*

Figure 4. *Painted Rocks strike.*

Figure 5. *Rain fringe lightning.*

Figure 6. *Willow Springs motif.*

had been struck by lightning. Here again the compass, held by the boulder, reacted to the magnetic alteration.

At the Hummingbird site, located between Sears Point and Painted Rocks, there are rain fringe and possible lightning symbols, but at the Garn site, which is located about a half-mile upstream from the Hummingbird site, there is a convincing lightning stroke coming down to the rain fringe (Figure 5). But the strongest case for lightning glyphs is found at Willow Springs, (located between Flagstaff and Page, Arizona), where ethnographic confirmation exists. The often repeated motif there (Figure 6), according to Ekkehart Malotki, "is called *yoyleki* in Hopi and is their traditional rain/cloud/lightning symbol"

Figure 7. *Yoyleki and "Maize."*

Figure 8. *Lightning to "Terrace."*

(personal communication 2009). Other versions are in relation to possible maize stalk (Figure 7) and to a lightning design reaching from the rain clouds to a cloud terrace design (Figure 8).

In southwest Utah there are two known lightning strike sites. Kirk Neilson wrote to me about a lightning feature in Warner Valley, west of St. George, which he called the Gargoyle site. Unable to find the location in maps I had, I wrote to Boma Johnson. He and his wife found the site, and because of the many bear paw symbols on surfaces

Figure 9. *Upper Big Bear panel.*

Figure 10*. Lower lightning panel.*

around the site, they called this the Big Bear Site. The lightning strike scar goes through both an upper and lower panel. The upper panel has a lightning scar coming down from the right side, and bending to the left toward a bear paw (Figure 9). In the lower panel the lightning strike scar goes down to the left of the bear paw (Figure 10).

Boma Johnson also pointed out the Snow Valley Pyramid Rock site, located to the north of St. George. The lightning strike descends straight down through a complex panel with many petroglyph layers and ages (Figure 11). While

Figure 11*. Pyramid lightning panel.*

much of the panel is heavily eroded, the enclosed cross is a Venus morning star symbol, and the reclining flute player may have "to do with laying down to play for ancestor spirits associated with stars in the night sky" (Boma Johnson, personal communication 2009). There appears also to be a glyph of a gourd rattle, such as would be used to accompany flute playing.

Jesse Warner led a field trip during the URARA Symposium at Delta, and in the Black Rock area, he held a compass over a lightning strike boulder. The compass reacted to the strong magnetic alteration caused by the lightning strike.

A dramatic instance of lightning symbolism is found in the Four Faces pictograph panel at Salt Creek, Canyonlands National Park, in Utah (Figure 12). As described by Carol Patterson-

Figure 12*. Utah's Salt Creek faces.*

Figure 13. *Tuba site by Cedar City.*

Figure 14. *Three Rivers petroglyphs.*

Rudolph in *On the Trail of Spider Woman*, "These figures have very short torsos of striped lines, rain and lightning symbols, and two figures have patterned belts, one with lightning descending from it" (Patterson-Rudolph 1997:30). Also in Utah, in the Cedar City area, there is a rain-cloud-lightning petroglyph at the Tuba site (Figure 13), in a picture sent to me by Alva Matheson, who chaired local arrangements for the 2009 URARA Symposium. It is similar to the Hopi *Yoyleki* rain, cloud, lightning symbols at Willow Creek, Arizona, but has double lightning strokes.

The terraced cloud symbol, previously pictured at the Willow Springs site in Arizona, is repeated several places in New Mexico. Most memorable is the cloud terrace with rain, rainbow, and lightning, with a bird on top, Jornado Style, at the Three Rivers petroglyph site (Figure 14). The bird in this petroglyph may have functioned as

Figure 15. *Velarde lightning bolts.*

Figure 16. *Petroglyph National Monument glyph.*

a messenger to the rain deities. When I inquired about a lightning panel in the Velarde area of New Mexico in a letter to James E. Duffield of Santa Fe, he sent a picture of lightning arrows with projectile points (Figure 15), and noted that flint and obsidian were thought by some native peoples to have been created when lightning struck the earth, hence the projectile points on the lightning. Duffield also sent a picture of a lightning bolt with projectile point connected to a bird's beak (Figure 16), located in the Petroglyph National Monument at Albuquerque (James E. Duffield, personal communication 2009).

Lyman Lake in east-central Arizona was created in 1912, when the Little Colorado River was

dammed. Across the lake on the east side, the "Ultimate Petroglyph Trail" leads up the ridge with geometrical, bird, and animal figures along the way. The trail ends up on top at "Ultimate Rock." A picture I had seen of this rock showed what appeared to be, among other glyphs, several lightning depictions (Farnsworth 2006:32–33). I was able to visit Lyman Lake with friends, and the ranger agreed to take us to the Ultimate Petroglyph Trail and Ultimate Rock, though a storm was approaching from the southwest. But rain began to fall when we were half-way up the trail, and because our boat was metal, the ranger insisted we return and hurry across the lake because of lightning danger. We were not able to stay until the bad weather passed, so I wrote the ranger later, expressing interest in having a picture of the lightning glyphs on Ultimate Rock. Soon I received a letter from Michael A. Freisinger, Museum Curator for Arizona State Parks, from his office in Phoenix. His letter included three pictures, one showing the glyphs on Ultimate Rock (Figure 17). He had written in his letter:

> I received your letter to Lyman Lake State Park concerning our petroglyph site at Ultimate Rock. As you found out there is a lot of lightning there, especially during the summer monsoon season. Arizona has the second most lightning strikes in the nation after Florida.
>
> Fortunately I have a collection of digital images of the petroglyphs at the park. I looked through them and am sending some very interesting ones depicting possible lightning glyphs [Michael A. Freisinger, personal communication 2009].

A second picture was of a rock with a damaged edge and two possible lightning zigzag designs descending (Figure 18). A third picture shows possible rain/storm/lightning lines and an upside down anthropomorph (Figure 19). While the boulder may have been displaced, sliding down and around from the escarpment above, an upside down figure at times may represent death, which is what the ranger felt might happen to us if our metal boat was hit by lightning as we crossed the lake during the storm.

Figure 18. *Two zigzag designs. Photo courtesy of Arizona State Parks.*

Figure 17. *Ultimate Rock glyphs. Photo courtesy of Arizona State Parks.*

Figure 19. *Lyman upside down figure. Photo courtesy of Arizona State Parks.*

Figure 20. *Zigzag lightning glyph, Hieroglyphic Canyon, South Mountain.*

Figure 21. *Man with lightning legs, South Mountain.*

Figure 22. *Mountain lion panel, Black Canyon.*

The most prominent lightning petroglyph at South Mountain, Phoenix, is in Hieroglyphic Canyon, and is described by Todd W. Bostwick in his *Landscape of the Spirits: Hohokam Rock Art at South Mountain Park*. Central in the panel is a powerful zigzag lightning design, with a fainter large waterbird on the right and two anthropomorphs (Figure 20). Bostwick notes how "meandering lines connect the large bird to the smaller humans and the lightning, giving the scene a sense of extreme power" (Bostwick 2002:92). Also at South Mountain, on the upper Mormon Trail, there is an anthropomorph with lightning legs (Figure 21). In the Mojave Desert, at Black Canyon northwest of Barstow, California, there is a lightning panel which includes a mountain lion with lightning tail (Figure 22).

CONCLUSION

The lightning motif has been related to petroglyph depictions of Tlaloc, the Mesoamerican rain deity. Polly Schaafsma declares that Tlaloc "controlled the rain necessary for raising crops in the high central plateaus and was in charge of floods, hail, frost and lightning" (Schaafsma 1980:237). Representations of the rain deity, Tlaloc, are found virtually everywhere Jornada Style rock art is found in the Rio Grande Valley and surrounding areas. Particularly elaborate depictions of Tlaloc are present at the Three Rivers petroglyph site (Figure 23) and at Alamo

Figure 23. *Three Rivers Tlaloc.*

Mountain (Figure 24), located east of the Rio Grande River, just above the border with West Texas. The torso of both Tlaloc figures have patterned lightning zigzags illustrating the association of lightning with powerful beings and the prominent role of lightning symbolism in Native American rock art, in relation to clouds and rain.

Acknowledgments. Members of URARA are always so generous and helpful. Ekkehart Malotki gave me the information on the traditional Hopi word *yoyleki* for their rain/cloud/lightning symbol at Willow Springs. Kirk Neilson told me about the lightning strike at Warner Valley, west of St. George, which he called the Gargoyle Site. When I could not find Warner Valley on my maps, Boma and Kat Johnson found the site, noting the many bear paws, and sent me pictures of what they called the Big Bear Site. They also told me about and sent pictures of Pyramid Rock in Snow Canyon. Jesse Warner took us to a lightning strike boulder, and Alva Matheson sent me a picture of the Tuba Site near Cedar City. Jim Duffield of Santa Fe, New Mexico, and a former URARA member, sent me the Velarde and Albuquerque pictures, and a black and white copy of his Alamo Mountain Tlaloc picture. I am also indebted to the pictures and response of Michael A. Freisinger, Museum Curator for Arizona State Parks. My daughter, Merrie L. Gough, gave me the book, *Where the Lightning Strikes*, by Peter Nabokov. Finally, I am grateful to the editors for working with my paper, and giving me the hard task of reducing the number of pictures from 48 to 24.

Figure 24. *Alamo Mountain Tlaloc.*

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Andrew Gulliford

PRESERVING SACRED INDIAN LANDSCAPES AND PROTECTING ANCIENT ROCK ART

For most tribes a sacred place is one where the Great Creator or spirits, both good and evil, communicate with the living. Most Anglo Americans consecrate a church as a sacred place and it remains sacred as long as a congregation meets there, but when congregations outgrow a building they then often sell it, purchasing new space which they then make holy. What is important for native peoples is not the sacred *space* of a church or cathedral or any other permanent structure, but rather a location made holy by the Great Creator, by ancient and enduring myth, by repeated rituals such as sun dances or by the presence of spirits who dwell in deep canyons, mountain tops, or hidden caves. An entire landscape may represent sacred geography because for thousands of years native peoples migrated from place to place in search of food on seasonal rounds that took them into the high country in the summer and to lower elevations in the winter. There are literally dozens of sacred sites for each tribe that are integral to tribal history, religion, and identity (Figure 1).

Figure 1. *A waterfall coming out of rock is a sacred site in Glacier National Park, Montana, for the Blackfeet Tribe who have a story of a female warrior who went to this site for a vision quest and received her vision here. Photo © Andrew Gulliford.*

Whereas for Christians the sacred teachings of the Bible are text-based, Indians honor oral traditions linked to specific sites such as Ribbon Falls in the bottom of the Grand Canyon, where the Zunis believe they emerged from the center of the earth as a people. Each tribe has its own story of emergence and migration.

A sacred site is always sacred and human burials or village sites are never abandoned because they remain hallowed ground. If shamans carved rock art panels to evoke spirits in southern Utah or at the bottom of Echo Park in Dinosaur National Monument in Colorado, then those places remain special and should not be disturbed. They are sacred sites where the living communicate with the dead or with powerful animal spirits of deer, elk, and mountain lions that the rock artist came to see in his visions.

Repetition and tradition, unbroken continuity over time—these elements are essential to native religion whether it is a young man at a remote vision quest site, a tribe like the Shoshones or the Utes at their annual sun dances, or Miwok leaders on a pilgrimage to collect plants for religious purposes as they visit sacred shrines in California. Native religion is intricately bound to a tight web of place and an intimate, subtle, even secret understanding of landscape.

Protecting and preserving native sacred sites depends upon identifying them and using the stories of native peoples, the skills of ethnographers, historians, and geographers to learn these sacred places so they can be protected. When land is lost to native peoples, federal laws

can help preserve and protect sites to which indigenous peoples do not have legal title or ownership.

Depending upon the circumstances, relevant federal laws may include: The Antiquities Act 1906; National Historic Preservation Act (1966 and amended 1992—especially section 304); American Indian Religious Freedom Act (1978); Archaeological Resources and Protection Act (1979 and amended 1989); Native American Graves Protection and Repatriation Act (1990); and Presidential Executive Order 13007 Protecting Native American Sacred Sites (1996).

Useful essays and publications include *National Register Bulletin #38 Guidelines for Evaluating and Documenting Traditional Cultural Properties* (Parker and King 1990) and articles in *CRM* (Cultural Resources Management) particularly the special issue "What You Do and How We Think" (Parker 1993). A key element in cultural resources protection for tribes is the issue of confidentiality. With legislation that passed Congress in 1992, tribes are not required to divulge information that may be sacred. Federal property managers must consult with affiliated tribes and the subsequent dialogues have gone far to improve federal-tribal relations. But what are sacred sites? After years of research, this typology emerged:

1. Religious Sites Associated With Oral Tradition/Origin Stories

The first category of sacred sites would be religious sites associated with ancient myths and oral traditions that figure prominently in emergence and migration stories. To use nomenclature from the National Register of Historic Places, these sites are "traditional cultural properties" that have deep meaning for tribal identity. Examples would include the huge stone monoliths in Navajo Tribal Park called "Big Hands" or barrels with spouts essential to storing and providing rain for the Navajo.

On the 18 million acres of the Navajo Nation, sacred places may be associated with the origin stories of clans, the origins of ceremonies, the origin of specific customs, and the general Navajo creation story. Other Southwestern tribes like the Zuni, Hopi, Walapai, etc. also have specific places linked to their clan migrations and creation stories.

2. Trails and Pilgrimage Routes

A second category of religious sites would be trails and pilgrimages through sacred landscapes such as the trail to Zuni Heaven or the Ute Trail, perhaps the longest and highest Indian trail left in the continental United States. Rising from 5,200 feet along the Colorado River to over 10,000 feet on the White River Plateau, the Ute Trail was used by prehistoric and historic Utes in their seasonal rounds of hunting on the Flat Tops Mountains. Associated sites within a few miles of the trail include vision quest sites, tall rock cairns, a shaman platform high in a piñon juniper tree, and Shield Cave.

Cairns as trail markers are particularly important for migratory peoples who remembered the cairns as a place to pause and meditate, as Nez Perce guides did along the Lolo Trail with Lewis and Clark in 1806 (Gulliford 2000:75). Indians also reverently added to the cairns as each passing traveler would say a prayer and add another rock to the pile for both personal good luck and respect for their ancestors who had gone before.

Along the Columbia River in Washington, tall cairns of basalt represented kinship and family lineage for the Yakima, as well as fishing boundaries for different plateau bands of Indians (Figure 2). Native peoples believe that cairns contain the essence of the builder and must be approached with care (Gulliford 2000:73).

3. Traditional Gathering Areas

A third category of religious sites would include gathering places for fish, wildlife, sacred plants,

and materials to quarry such as mineral deposits which are sources for face and body paint. Paint sources were so crucial to religious ceremonies that on the Great Plains paint mines would be neutral territory and warring tribes could gather red, yellow, and black clay in peace without attacking one another. Sacred paint sources include the Paint Mines near Calhan, Colorado and in Wyoming at Sunrise and Rawlins. Shield Cave in Glenwood Canyon, Colorado is a rare site that contains every clay color needed in Ute religious ceremonies. Utes knew of the cave in oral tradition and had remembered it for decades before the Bureau of Land Management contacted tribal leaders about its exact location. Now the site is officially protected and visitation by non-Indians is discouraged (Gulliford 2000:78).

Navajos gather hematite and special dirt and sand for sand paintings, and most Southwestern tribes have sacred places where men gather salt. There are sacred gathering areas for clans to gather special roots and herbs as well as family use sites. There are gathering areas for willows to be made into baskets, wild tea for medicinal purposes, and special water from sacred springs or snow melt from high elevations. For their *Jish* or medicine bundles, Navajo medicine men may also collect projectile points and pieces of petrified wood because oral traditions are also linked to the fossil record. Plants are also used in religious ceremonies.

Figure 2. *Ancient rock cairns on the Columbia River Plateau in Washington State represent clan and family lineages and also fishing boundaries for the river below. This image was used in the Advisory Council on Historic Preservation's Report to the President and Congress of the United States, 1993. Photo © Andrew Gulliford.*

Traditional gathering areas for sacred sage, sweetgrass, and other herbs are special places to be protected. Tribal sacred sites include these traditional cultural property areas where for generations tribes have gathered food, whether it be salmon among the Columbia Plateau Indians, bitterroot among the Shoshones, camass roots among the Nez Perce, or huckleberries among the confederated tribes of Warm Springs and the Yakima Nation. These sites are sacred because they bring the people together each year at harvest time to gather plants for the first feasts and to initiate young girls as women and young men as hunters or fishermen. Gathering roots and berries in the old way keeps the people physically strong and knitted together by social tradition.

4. Offering Areas: Altars and Shrines

Just as tribes have gathering areas for collecting plants and medicines, native peoples also make offerings either privately or within ceremonial cycles when sacred materials are gathered. There are also specific locales where at certain times of the year offerings of prayer sticks and special foods are prepared for the Creator to keep the people in harmony, to heal the sick, and to provide general balance and prosperity. Offerings are also left for powerful animals like bears and buffalos.

These sites could be prehistoric, as in altars and shrines found on Whiskey Peak in the Green Mountains in southeast Wyoming or in the Wickiup Village site near Rifle, Colorado, where at a slight remove from the wickiup village a shaman left an altar and stone palette for offerings to the Creator (Gulliford 2005:948). Though archaeologists consider the sites prehistoric in terms of age, for native peoples such time distinctions are irrelevant. Altars are never

Figure 3. *A rare Ancestral Puebloan shrine on BLM land in southeast Utah remains untouched on a steep canyon wall. Photo © Andrew Gulliford.*

abandoned; they represent active conduits to the spirit world. Figure 3 shows a rare shrine in southeast Utah.

5. Vision Quest and Other Individual Use Sites

A fifth category of religious sites would be sites used by single individuals such as vision quest sites. These are often composed of stones 18 to 24 inches high and placed in a horseshoe or circular shape. The young man or woman seeking a vision enters the earth or stone enclosure, remaining without food or water until the arrival of the animal or bird spirit who then becomes the source of his or her personal power or medicine. Most vision quest sites are on high precipices with panoramic views, often 360 degrees, and "are among the most common forms of sacred geography in North America" according to Deward Walker (1988). There may also be small, individually-used sweat lodges or wooden tree platforms used by medicine men for meditation and healing.

Vision quest sites can be found at remote locations throughout the Rocky Mountains and northern Great Plains, and Indians who visit them today often leave offerings of sacred sage, tobacco, or water to placate the spirits. An Indian might reuse the site for a modern vision quest or leave it undisturbed, but in either case a seeker of visions has made it a sacred place and federal land managers must protect the sites.

6. Group Ceremonial Sites: Sweat Lodges, Dances, and Sings

Ceremonial dance sites such as sun dance, bear dance, or other dance sites are also sacred places and usage may date back for decades. Among Plains Indians the sun dance lodge is erected at the same spot in a lengthy ritual that includes having a virtuous woman select the forked aspen or willow tree for the central lodge support. Under the direction of the sun dance chief, dancers and helpers raise the twelve roof poles of the lodge, whose opening always faces east towards the rising sun. The lodge or corral is eventually covered with fresh willow branches to give the dancers shade as they dance and blow their eagle bone whistles (Gulliford 2000:86).

Just as with the routes taken by the Shalako spirits at Zuni or the Deer Dancers at Taos Pueblo plaza, what is sacred here is the reconstruction of tradition through meditation and performance. Keeping the sun dance structure intact in the tradition of Christian churches would be contrary to Indian beliefs. Building the sun dance lodge anew brings people together and that act is far more important than the lodge itself. The wooden frames of large, group sweat lodges are also sacred, whether they are the stout cedar poles of Navajo sweat lodges in the bottom of Canyon de Chelly or the framework of thin willow pole lodges from the mountains.

Dozens of kivas in the Southwest are still actively used by men's societies to initiate young boys, and on the high mesas of the Southwest, like the village of Walpi on First Mesa at Hopi, ancient plazas still reverberate with the dance steps of the Kachinas and snake dancers in special ceremonies now closed to non-natives.

Figure 4. *Ancestral habitation sites qualify as sacred sites for most tribes. This PIII site epitomizes a small defensive site in southeast Utah. Basketmaker II sandal petroglyphs adorn the rock wall below the ruins. Photo © Andrew Gulliford.*

7. Ancestral Habitation Sites

Another category of sacred sites would be archaeological or ancestral sites still vital to the spirit world (Figure 4). This would include ancient Puebloan ruins or the cliff dwelling homes of Ancestral Puebloan peoples as well as teepee rings where Plains people once set up encampments. Brush shelters or wickiups for Great Basin tribes and Utes in Colorado would also qualify as sacred village sites, as would log hogans and sweat lodges.

8. Petroglyphs and Pictographs—Ceremonial Rock Art

Many petroglyphs, pictographs, and pictograms qualify as sacred. The Shoshone believe petroglyphs represent messages from the spirit world and that only properly trained medicine men or shamans can decipher them. Ceremonial rock art also often illustrates origin and creation stories and can be found on the tops of mountain peaks, on boulders in the bottom of drainages, and along pilgrimage routes—anywhere the rock surface can be incised down to the desert patina and under ledges protected from weathering (Figure 5).

9. Individual Burials and Massacre Sites

As with all cultures, human remains are sacred to tribal peoples and with the passage of the Native American Graves Repatriation and Protection Act of 1990, all unmarked graves found on public lands are now protected, though tribes have different opinions as to what reverence should be attached to burials.

In addition to Indian burials both historic and prehistoric, another sacred category includes massacre sites and mass burials such as the Marias River Massacre site and Big Hole Battlefield in Montana, Sand Creek in eastern Colorado, Washita River Battlefield in Oklahoma, the Camp Grant Massacre in Arizona, and Wounded Knee Battlefield at Pine Ridge, South Dakota. These sites of shame, where armed military forces attacked Indian villages, are only recently being protected and interpreted.

10. Observatories and Calendar Sites

Massive stones atop Fajada Butte at Chaco Canyon National Historical Park in New Mexico function as a solar and lunar calendar, designed by ancient Puebloan peoples to mark the passage of time and seasons for their communities.

Figure 5. *To protect Newspaper Rock and its thousand years of petroglyphs in Canyonlands National Park, the National Park Service has erected a chain link fence. Photo © Andrew Gulliford.*

Throughout the Southwest, stone alignments and concentric circles on rock art may indicate solstice markers.

THE LACK OF AN AMERICAN CULTURAL EXPORT LAW

Native American cultural traditions are being sustained and created, but prehistoric rock art sites need to be protected. Native American cultural objects also need protection because they are routinely stolen and often leave the United States (Gulliford 2009b). The black market for cultural objects, specifically antiquities, continues to thrive in part because unlike most other countries, the United States does not have a cultural export law. Anyone can get on an airplane with a rare Zuni pot, an Ancestral Puebloan basket, Civil War uniforms, or any other American artifact and take it overseas (Figure 6).

One reason the antiquities market is so successful is that it is, and has been, an excellent way to launder illegally acquired cash. In the Southwest the phrase is "rugs and drugs." Native peoples are now deeply burdened with rural addictions to methamphetamines and to pay for an expensive drug habit, antiquities and cultural objects are stolen and sold. Each time an artifact is sold it increases in value until it finally lands in the hands of unscrupulous collectors who could care less where something came from as long as they can own an authentic piece of the past. Tony Hillerman has explored this chain of theft in his popular book *A Thief of Time* (Hillerman 1988).

Figure 6. *One of the rarest of all Southwestern prehistoric ceramics, the Mimbres bowl known as the Three Cranes Bowl was pothunted, stolen, returned to its pothunting owners, and then promptly sold on the black market. It has not been seen for over twenty years. Photo © Andrew Gulliford.*

As Native American populations grow, as elders pass on, as tribes continue to defend their treaty rights and sovereignty, protecting sacred objects and sacred places such as rock art sites will become even more important. For five centuries now Indians have fought to survive and maintain their identity amidst non-native encroachment, theft, and misguided assimilation policies. Now Native Americans, Native Hawaiians, and Alaskan natives can help to determine their own futures, in part by knowing their ancient cultural traditions and by preserving that which is centuries old. In Utah, the fight continues to preserve and protect some of the finest and oldest rock art in North America.

Of the thousands of Indian rock art panels in the Southwest, few are older than Barrier Canyon pictographs found throughout the San Rafael Swell in Utah. From tiny five-inch animal figures to stunning seven-foot tall human shapes with no arms or legs and alien-like bug eyes, Barrier Canyon style images are usually a dark blood red color. They may have been painted 8,000 years ago; many panels are at least 5,000 years old (Kelen and Sucec 1996:13, 14).

For a week friends and I drove 4WDs and then hiked into remote locations in Emery County, Utah, to photograph these spectacular ochre red paintings. We set out to find a few of those sites, and in side canyons and small slot canyons, we found them. The images of eerie, elongated figures

Figure 7. *A detailed image of an evocative Barrier Canyon pictograph on the San Rafael Swell. Note what appear to be free-floating eyeballs with wings. Photo © Andrew Gulliford.*

with shortened arms and legs are hard to decipher. The anthropomorphs, or human figures, often have overly large eyes, no ears or noses, and no way to distinguish gender. Snakes writhe in their hands or above their heads. Yet circling these fierce, faceless creatures are delicate menageries of exquisitely painted birds, ducks, geese, deer, and occasionally what appear to be free floating eyeballs with wings (Figure 7).

I'll not forget the blustery spring day with a storm front moving across Utah and we seven hiking all morning to finally find a few red symbols high on a cliff face shaded by a small alcove. We scrambled up and there, in the silence of the Swell, the few symbols seen below blossomed into small panels of intricate images expertly drawn in the Barrier Canyon style's signature red paint.

Standing just a few feet from the panels, we could study the masterful brush strokes, the lyrical zoomorphs or animal-like creatures, and the red paint's perfect preservation. The artist had added a few white dots and faint white streaks. Seated on a sandstone ledge, looking south across a vast canyon landscape, rare pictographs just behind my shoulder, the twenty-first century melted away. Time ceased. I thought if we waited, with luck the artist might return. Instead, there was only the wind.

Another afternoon hike up an unnamed canyon seemed fruitless. Perhaps one of our guides had made a mistake. Then when we were almost across from it, we saw a panel of human figures with the largest one a somber red, almost brown, that may have been eight feet tall. We stared in wonder. The ghost-like images without arms or legs may be shamanistic art.

The most famous Barrier Canyon panel is the Great Gallery in a remote section of Canyonlands National Park named Horseshoe Canyon. But we wanted to hike in wilderness study areas to see ancient art generally not visited. In the vastness of the Swell we could do that. On the fifth day we came across a finger-painted panel of four figures that looked as fresh as if it had been painted that week. One of our party quipped, "If this paint can last 5,000 years, why can't my house paint?"

Barrier Canyon paint is only one of the mysteries. Probably mixed from vegetable and mineral compounds, the paint is 10 percent blood according to BLM interpretive signs, but whether human or animal is uncertain. The sophistication of the art, which seems to represent a vibrant and complex spirit world, is made more mystifying by the fact that the artists were Archaic period (6500–2000 B.C.) mobile hunters and gatherers who did not plant corn and who lived a precarious subsistence lifestyle. They hunted with spears, and yet when we returned to the famous Buckhorn Wash panel to study it in afternoon shade using binoculars and long camera lenses, I felt I was in the presence of sacred art as powerful as anything on the ceiling of the Sistine Chapel.

In 1995 in an award-winning Utah State Centennial Legacy Project, dozens of citizens and volunteers worked to remove bullet holes, graffiti, crayon, and chalk from the Buckhorn Wash Rock Art site's eight panels (Gulliford 2009a). They moved the road farther from the site, added fencing, parking, landscaping, an interpretive trail, and restrooms. Special erasers, jeweler's tools, watercolor paints, and pastels were used in panel

restoration. Now visitors can see scenes of rituals, celebrations, and homage to Native American gods painted thousands of years ago by artists using brushes of hair, feathers, and yucca fibers.

But all is not well on the Swell, which is a BLM Special Recreation Management Area of 938,500 acres. The Southern Utah Wilderness Alliance and ATV groups continue to squabble over wilderness designation and wilderness boundaries for seven wilderness study areas. ATV use and illegal roads increase yearly. The under-funded Bureau of Land Management has few staff to enforce regulations on back country travel, and rock art vandalism is an ongoing problem. Far too many panels have been shot at or scratched over.

One site we visited, not as impressive as the Buckhorn Panel but still possessing ancient Barrier Canyon Rock Art, was beneath a small cliff face at Molen Seep. For many yards the base of the cliff was covered in cow poop. I'd like to forget that afternoon but I can't; just as I can't forget the rare feeling of hiking into remote canyons to discover 5,000 year-old paintings. Exploring the Southwest is why many of us live here, and yet personal self-discovery isn't enough. We must advocate for public lands and do our best to protect the natural and cultural treasures we enjoy.

I wrote a letter to the BLM. I told them I'm happy to put on leather gloves and volunteer to string fence at Molen Seep. No one ever replied. Meanwhile, I keep thinking of those blood-red Barrier Canyon figures in the unnamed canyon wash. How much longer will they be safe?

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Abstracts of the Twenty-Ninth Annual Symposium of the Utah Rock Art Research Association in Cedar City, Utah, October 9–12, 2009

Lawrence L. Loendorf *Archaic and Older Petroglyphs on the High Plains*

Over the past three decades, archaeologists have developed a good chronology for Archaic-age petroglyphs on the High Plains. They have also been able to sort out differences in the types of figures associated with the Early Archaic, the Middle Archaic and the Late Archaic. With this knowledge, it is possible to search for sites where Archaic petroglyphs are superimposed on older petroglyphs, which by their superimposition are possibly Paleo-Indian in age. Several sites with these ancient petroglyphs have been found on the High Plains. Somewhat surprisingly, the oldest petroglyphs are finely incised abstract designs rather than the big game animals expected by many researchers. Animal scenes are much later on the High Plains when they are associated with drive lines and surround sites.

Boma Johnson *The Rock Art and Ancient Cultures of Southwestern Utah*

Our understanding of Native American culture is changing rapidly as we broaden our studies of their visual communication systems. In particular, Native American rock art is a prime source for research and learning what the Native Peoples believe about the functions and intent of this form of their communication. This presentation investigates a set of issues, which can shed light on the human side of rock art, making connections between the rock art and its makers. These are: (1) Do Native Peoples still make rock art, and why? (2) Did Native Peoples make changes to their rock art in prehistoric times; if so, why? (3) What are some of the influences of modern people on rock art, including ethnographic research, learning directly from Tribal peoples, and even issues behind tribal conflict leading to site desecration? (4) What can we learn about rock art from other forms of historic and modern Native American art?

Leticia A. Neal *Fluid Frontiers: People, Pots and Rock Art Imagery*

Southeastern Utah was occupied by groups for whom movement, "abandonment," and reoccupation was a way of life. Although the Fremont and the Anasazi are often conceptualized as distinct cultural traditions, underlying similarities in lifeways are embodied in their use and conception of the landscape. The nature of Fremont and Anasazi interaction is examined by presenting new data on rock art sites in conjunction with other lines of established archaeological evidence. Typically, the Colorado River is used to demarcate the boundary between the Fremont and the Anasazi. Generally, Fremont rock art styles and sites are located north of the Colorado River, while Anasazi rock art styles and sites are south of the Colorado River. The distribution of Anasazi and Fremont sites, ceramics, and rock art imagery indicate a level of interaction, suggesting a fluctuating border as people, pots, and rock art imagery moved across this frontier.

Caroline Merrell *Exploring the Cave Valley Style*

Cave Valley is a distinct style of rock art thought to have had its genesis in a cave located in Zion National Park. It is best described as a humanoid figure constructed from six interconnected triangles. Variations on this theme include head adornments, more naturalistic appendages and other body decoration. Little is known about the distribution of this style element or its possible cultural affiliation. Research, currently in the initial stages of inquiry, is leading to a better understanding of this design element, its variations, cultural affiliation and geographic distribution.

Farrel Lytle *How Old are Petroglyphs?*

The technique of chemically analyzing petroglyphs with the x-ray fluorescence technique (XRF) will be demonstrated to be a reasonably accurate non-invasive dating method. It is simple in concept: measure the concentration of a target element, usually manganese (Mn), on the glyph and on a non-varnished piece of the same kind of rock. Subtract the rock analysis from the glyph analysis. The difference is due to the production of Mn by the growth of bacteria, which create desert varnish. An age calibration was achieved by measuring matched XRF and cosmogenic isotope-dated surfaces over the range of 5,000-40,000 BP. The accuracy of measured dates were compared with available dated surfaces: Cosmogenic isotope-dated rocks, a C(14) dated basalt flow, re-varnished basalt boulders from the Bonneville Flood, the precision of replicate measurements of the same glyphs and the archaeological context of dated petroglyphs. Over the range of 1,500 to 30,000 years BP a measured date of a glyph or of undisturbed desert varnish was demonstrated to be accurate to ± 30% 1 sigma. Photos of dated glyphs will illustrate changes in style and context with change in age. Dated glyphs in southern Utah ranged from 1,000-10,000 BP.

James A. McNeil *Making Lemonade: Using Graffiti to Date Petroglyphs*

Graffiti, the curse of rock art researchers and enthusiasts, may provide assistance, albeit unintended, to the challenge of rock art dating. The process of desert varnish patination concentrates manganese on the rock surface, which can be used for dating. Lytle, et al. (2008) collected desert varnish samples in Utah and dated them using cosmogenic ^{10}Be and ^{26}Al isotopic abundance and geological events. Using x-ray fluorescence (XRF), they also measured manganese levels in the same samples, which allowed them to develop a Mn-vs-age calibration curve enabling them to date several petroglyphs in the Coso area using field-based XRF measurements. In this work we also use XRF to measure Mn levels in the desert varnish of re-patinated petroglyphs but attempt to use dated graffiti located on or near the petroglyphs for calibration. We will describe our experimental and analysis procedures, report on preliminary measurements of Mn levels in several petroglyphs and graffiti in the Moab and Bluff, Utah areas, discuss implications and limitations of the approach, and relate our work to that of Lytle, et al.

Thomas Heyd *The Case for Aesthetics and Rock Art Research*

Only recently has there been a rediscovery in anthropology and archaeology of the importance of aesthetics and art. Nonetheless, hardly any papers have appeared that directly discuss the aesthetics or the art status of rock art. In this paper I argue that there are good *prima facie* reasons for pursuing the aesthetic consideration of these marks on rock despite the prevailing trends. I point out that it is unnecessary to suppose that, for aesthetic appreciation, we have to ignore context, and focus on some universal or 'transcendental' quality. It similarly is unnecessary to limit the term 'art' to those phenomena that resemble those of the modern, European art tradition. Moreover, we need not know the intentions of the makers of rock art in order to usefully approach such manifestations from the aesthetic point of view.

David Sucec *Falling Lines; The Parallel Line Motif as a Defining Feature of the Barrier Canyon Style*

Widespread among the Archaic Period rock art styles on the Colorado Plateau, the *parallel line motif*, is commonly called a "rake" but, in the Barrier Canyon style, the lines are longer—more like a broom with incremental spacing—and most often vertical. And it is this lengthy verticality, which makes the parallel line motif a defining feature of the Barrier Canyon rock art style.

David Maxwell *Update on Waterglyphs*

Since 1997 a team of researchers have been conducting a survey of a particular series of ancient rock carvings on the Arizona Strip. These glyphs cover an area of more than 2,000 square miles along the Utah, Arizona and Nevada borders. These unique markings have been called WaterGlyphs, Ancient Navigation symbols, and even Traverse Glyphs. One thing for certain is they exist and there are now (fall of 2009) over 320 of these glyphs found, documented, and analyzed. An update on the research, findings, and statistics groupings of the glyphs will be shared.

Bernie Jones *Anthropomorphized Crook Images*

Fragments of Chemehuevi ethnography tell of a crooked staff being a spirit, speaking to its owner and "having a life of its own." Traditional Pima creation narratives speak of ancestral Hohokam deities and their crooked canes. These canes were able to fly and some had "eyes like a person." Echoes of these oral traditions are found at Acoma Pueblo where crooked staffs are felt to be animate, and at Jemez Pueblo, where the combination of crooks and prayer sticks used to "pull down the rain," have male and female faces. A number of rock art panels scattered throughout the American west provide visual confirmation that similar stories were transmitted, understood and illustrated by cultures considerably older than those found in the existing ethnographic record. This paper explores an amazingly similar, widespread, pattern of anthropomorphized crook motifs. These rock art images give the impression that the crooks are indeed animated and involved in a life of their own.

Steven J. Waller *Voices Carry: Whisper Galleries and X-rated Echo Myths of Utah*

Be careful what you say in the canyons of Utah. Acoustic experiments at many rock art sites have revealed that petroglyphs and pictographs are typically located at places with unusually strong sound reflection. Indeed, one recently discovered rock art site in Arch Canyon, UT, was found via echolocation. Examples are given of rock art sites at which voices carry for unexpectedly long distances: whisper galleries and other echo focusing effects. Such complex auditory phenomena were considered to have supernatural causes, and echo spirits were believed to dwell within the rocks. Great Basin mythology will be presented that includes tales of echo spirits in which sexual content is integral to the storyline.

Galal Gough *Lightning and Native American Rock Art*

The Introduction will provide ethnographic sources for Native American fascination with lightning, including quotes from *Where Lightning Strikes*, by Peter Nabokov. Then five petroglyph sites associated with lightning strikes will be illustrated, with two in Arizona – at Sear's Point and Painted Rock along the Gila River – and three in Utah – the Warner Valley Gargoyle or Big Bear Site and the Snow Canyon Pyramid Rock Site, both in the greater St. George area; and the Desert Mountain Site, south of fringes in Arizona, and cloud terrace depictions with rain, rainbow and lightning in New Mexico will be featured, along with other lightning power symbols in Arizona and Southern California.

Michael Firnhaber *Experiencing Rock Art: A Phenomenological Investigation*

Rock art is emplaced. Sites are fixed permanently to the land, and exist today in the very same places chosen by ancient artists. As such, a visit to a rock art site is much more than a visual affair. Going to a rock art site is a visceral, embodied experience. This study systematically explores *how* Barrier Canyon Style rock art is (and was) experienced, and works towards a better understand of the relationships between the rock art, the landscape, and the people who produced and consumed the sites and their images.

Richard Jenkinson *Rock Art on an Ancient Migratory Route*

This presentation will report on the relationship between rock art and landscape along a proposed migration route in the Canyonlands area. The fifty miles of canyons that I have studied this year contain over 100 rock art sites. In hiking the sites I have been able to draw some preliminary conclusions about how the rock art is experienced as people move through the canyons and about relationships between rock art, geology and landscape.

Jesse Warner *The Enigma of Fish Creek Cove*

Previous analyses of the rock art at Fish Creek Cove have been a disappointment in relating what it is all about. There are three areas of misconceptions. First, is the "acephalous" nature of the line of eight animals. Second, is who created them, and third is what they may have represented. At the site it is obvious that they are not acephalous. They do have heads, but are not what we would normally expect. What is there is a clue to their mystique. Evidence suggests that they were not produced by the Barrier Canyon Style as most suggest. And lastly, there is a significant amount of evidence suggesting that they do not represent a simple drive setting or butcher shop. The evidence points in the direction of esoteric and possible rites of initiation. In presenting the evidence for these conclusions we will also consider the importance and care of one's own personal observations and comparative analyses over using the research of others as an accurate assessment of what the situation really is.

V. Garth Norman *From Petroglyph "Doodles" to a Rich Archive: Breaking the Parowan Gap Code through Archaeological Context*

Archaeology context is difficult to establish for petroglyph sites. The Parowan Gap Archaeological Project (1993-2003) in southwestern Utah is exceptional in this regard. A matching ISTEA grant from the Federal Highways supported ARCON's consulting contract for Parowan City and Iron County. The research design maximized data collection for petroglyph interpretation in seven tasks: existing records search, ethnography survey, remote sites comparison, excavation for historic cultural context, petroglyphs recording, 1800 acre sites survey, and archaeoastronomy survey for calendar observatory sites. Engineering design plans proposed preservation enhancement construction. The major achievement of the project was full documentation of a sophisticated calendar observatory within a cosmic wilderness temple center, along with significant petroglyph interpretation, and cultural ties to the Southwest and Mesoamerica.

Nal Morris *The Path of Discovery to Parowan Gap*

The calendar discovered at Parowan does not stand alone. Computer modeling of solar motion at Rochester Creek strongly implied an octant calendar that divided the year and solar motion at five key date alignments. Would this calendar be supported by other sites? There were two problems: It required a post in front of the panel. But - it was too neat to go away! Numbers, legend and alignments reeked of intelligent design. The "Path of Discovery" started with the "Great Balloon Fly at Mussentuchit," fun, but no support found. The Medicine Wheel at Freestone Ranch was supporting but not conclusive. The Clifford Rayle Octant Calendar at Comb Ridge gave us a post hole but very mysterious. Great support came from Grapevine Canyon, Nevada. Things were looking up. And finally gratification with the "Ninth Symphony" of the all octant calendars confirmed by many, many correlations, solar and lunar, and Venusion at Parowan Gap.

Arthur Cloutier *Four Rock Art Panels in Western Grand Staircase-Escalante National Monument*

The panels to be described are accessible from Highway 89 in southern Utah. The discussion will include comments about style, age, cultural affiliation, and archeoastronomy for panels, which are in danger of being damaged because of the increasing visitation to the national monument. Access issues currently in litigation with BLM and Kane County will be briefly described. These panels are all mentioned and briefly described by Michael Kelsey in Hiking and Exploring the Paria River. They are The Big Horn Panel on Deer Creek, Starlight Cave in Starlight Canyon, and two unnamed panels at the confluence of Starlight Canyon and Paria River which contain several historic signatures as will as pecked rock art.

Sunday Evening Community Lecture - Heritage Center

Andrew Gulliford *Preserving Sacred Native American Landscapes*

From his ongoing research and book *Sacred Objects & Sacred Places: Preserving Tribal Traditions*, Dr. Andrew Gulliford will present an illustrated slide lecture defining humanities issues in the Southwest connected to preserving archaeological and cultural landscapes. He will discuss ten categories of sacred sites, including rock art, and also explain why the United States needs a national cultural export law to restrict ongoing vandalism and pothunting. Dr. Gulliford will address the federal laws and executive orders, which protect Native American sacred landscapes. He will also use a case study approach to discuss contemporary issues related to oil and gas development in the American West and the need to re-define what constitutes an archaeological site in favor of a broader definition of archaeological landscapes.

This program received funding from the Utah Humanities Council. The Utah Humanities Council promotes understanding of diverse traditions, values and ideas through informed public discussion.

Addenda

Steven J. Manning

BLACK ROCK MAN: Unique Characteristics of Anthropomorphic Images in the Eastern Great Basin that Divide the Fremont into Two Ideological Regions

Archaeologists use inherent physical characteristics called attributes to define and characterize prehistoric cultures. One of these cultural attributes is rock art. Archaeologists, however, have seldom used rock art as a component to define a culture, or even an intra-cultural boundary. Probably the most notable occasion when this rare event occurred was when Noel Morss, an archaeologist from Harvard University, included Utah rock art in his description of how the Fremont cultural region differed from that of the general southwest (Morss 1931). Morss noted that the rock art in central Utah was unique and was characteristic of a distinctive society, which he named the Fremont after the Fremont River drainage in central Utah where he was excavating sites. He stated that this rock art was, "among its most interesting antiquities" (1931:34).

This paper reports on a study of Fremont images in the eastern Great Basin (western Utah and eastern Nevada) where attributes of certain rock art images define a broad division of the Fremont culture. This division separates the Fremont into two distinct ideological regions—one on each side of the Wasatch Mountains. (The Wasatch Mountains run north and south almost through the center of Utah.)

The rock art attributes that define this division consist of a dispersed collection of anthropomorphs that have similar features that distinguish them from others in surrounding areas. The greatest numbers of these anthropomorphs occur in the Black Rock Deserts of eastern Utah. They also most often occur on black volcanic rock, i.e., basalt. In addition, most of the anthropomorphs appear to be male. (These topics are discussed in detail below.) Because of these characteristics, I have named this type of anthropomorph, the Black Rock Man. This is supportable because there is a precedent for naming a particular type of image after a location where it occurs. In southeastern Nevada there is a type of anthropomorph that has been named the Pahranagat Man after features in the area, such as the Pahranagat Mountain Range, Pahranagat Valley, Pahranagat Wash, Pahranagat Lake, etc. (Stoney 1991).

RELATIONSHIP TO FUGITIVE PIGMENT ANTHROPOMORPHS

The collection of images of the Black Rock Man type was identified following a paper I presented at the URARA symposium in 1993 (Manning 2004) in which I defined *Fugitive Pigment Anthropomorphs*. Fugitive Pigment Anthropomorphs are images of human-like figures that were created with pigment that was relatively short-lived when compared to other pigments. Substances that were used to create these images were clay, charcoal, and apparently organic pigments derived principally from plants. Other materials could also have been used. The use of clay and charcoal pigments is evident from images found in caves where no erosion has taken place and those images that were covered over with mud, which has now eroded away revealing traces of these original pigments. Following the creation of the body of these anthropomorphs, features such as eyes, mouths, necklaces, bracelets, hair ties, etc., were made by pecking or abrading away the pigment. This action also exposed the underlying rock, which created a contrasting and easily distinguished feature. Sometimes portions of the images were outlined by abrading away what was likely an uneven edge that was created when the pigment was initially applied to the rock. This abrading produced a clean and distinct edge and gave the images a highlighted and three-dimensional appearance.

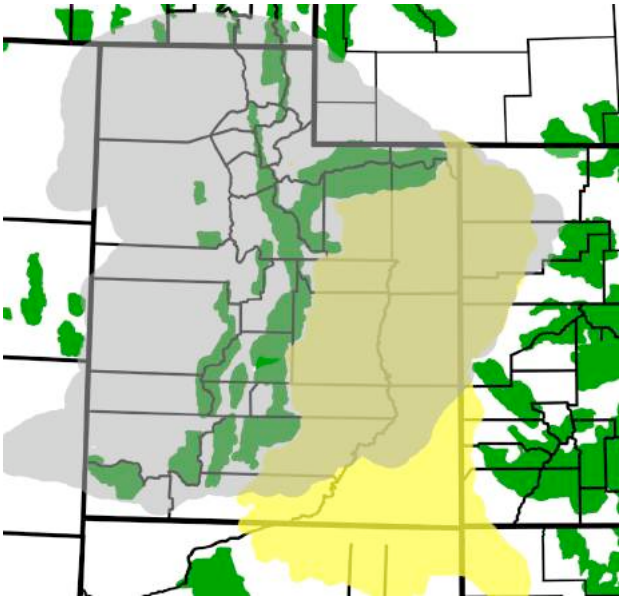

Figure 1. *The yellow area of the map shows the distribution of fugitive pigment anthropomorphs. The distribution of the Fremont Culture, as demonstrated by Fremont ceramics, is shown as an overlay in gray. The green area is National Forest land.*

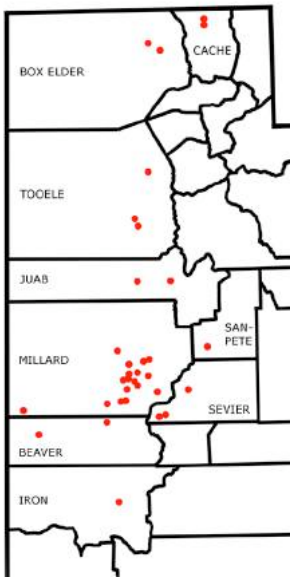

Figure 2. *Distribution of the Black Rock Man images in the Black Rock Deserts of western Utah. More than one site may be covered by one dot.*

When the fugitive pigments eroded, all that was left of the anthropomorphs were the pecked or abraded portions. The entire body of a fugitive pigment anthropomorph is sometimes visible when the image was created on a patinated surface. When this occurred, the formation of patination beneath the pigment was terminated. Meanwhile, the patination continued to form and darken the surface surrounding the image. When the pigment eroded away, the image became visible as a silhouette.

A detailed study of many thousands of images in seven states determined that the fugitive pigment anthropomorphs, with only one exception, exist in the Colorado Plateau. The yellow area in Figure 1 shows the distribution of the fugitive pigment images. The gray area is the distribution of the Fremont Culture, as demonstrated by Fremont ceramics.

It became apparent that the boundaries of the *Fugitive Pigment Anthropomorphs* are ranges of mountains. This is generally indicated in Figure 1 by the National Forest lands, which are shown as the green areas. The boundaries of the fugitive pigment anthropomorphs are the Wasatch Mountains on the west, the Uintah mountains on the North, and the Colorado Rockies on the east. The extent of the fugitive pigment anthropomorphs in the south has not been determined; however, they do not seem to be present south of the Anasazi cultural boundary. It is important to note that the distribution of fugitive pigment anthropomorphs suggests that the cultural affiliations of the images are both Fremont and Anasazi.

As stated above, the discovery of the fugitive pigment anthropomorphs led to the discovery of the Black Rock Man images in western Utah. This occurred as follows. Since fugitive pigment anthropomorphs, of which there are many hundreds if not thousands, are all (with only one known exception) located east of the Wasatch Mountain range, two questions arose. One: is there a characteristic in the rock art west of the Wasatch Mountain range that is unique to that particular region. And two: is that characteristic also a distinctive type of anthropomorph with unique features?

In an attempt to answer these questions, I examined photographs of the rock art sites in western Utah. I thereby discovered the existence of a

dispersed collection of anthropomorphic images that were located only in the eastern Great Basin—the Black Rock Man type. Their locations are shown in Figure 2.

The significance of this discovery is that that rock art in western Utah substantiates the division of the Fremont Culture, which was shown to exist by the existence of fugitive pigment anthropomorphs. The two different types of anthropomorphs, confined in their two relative areas, offer definitive evidence of the existence of two different Fremont ideologies, which were separated by a geographic feature—the Wasatch Mountain Range.

BLACK ROCK MAN TYPE SITES

The defining characteristics of the Black Rock Man type images are not entirely a unique physical form of a particular anthropomorph. They include different, but typical Fremont anthropomorphic variations that are found intermingled over a wide area. There are also some limited distributions of unique depictions of human images within this broad area. The principal, but not exclusive, defining characteristic of these images are the unique objects held in the hands of the anthropomorphs.

These images, taken as a whole, are an integral part of the prehistoric Fremont Culture of western Utah, as shown by their extensive distribution (see Figure 2). They range from near the Idaho border in the north to near Cedar City in the south. East to west they range from the western base of the Wasatch Mountains westward to at least the Utah-Nevada border. The western extent of these images is uncertain. (It will be interesting to see if future research determines whether they are found west of the boundaries of the Fremont Culture.)

The uniqueness and distribution of the Black Rock Man images, to be discussed below, demonstrates that the Fremont in western Utah possessed significantly different cultural beliefs or practices than the Fremont in eastern Utah.

DEFINITIONS AND EXAMPLES

The Black Rock Desert is the name of a semi-arid area in western Utah that contains outcrops of black volcanic rock. This black volcanic rock originated from volcanoes, cinder cones, and lava flows. The Black Rock Desert on Utah maps ranges from a little north of Delta, Utah, to a little south of Cedar City, Utah. The area contains Utah's most recent volcanic activity, which occurred about 600 years ago. For the purposes of this discussion and to facilitate a characterization of the images and their environment, the term Back Rock Deserts is used here. I define Back Rock Deserts as the arid lands on the western side of the Wasatch Mountains that contain volcanic activity. This area of volcanic activity runs from Idaho to Arizona on the eastern edge of the Great Basin. The following is a description of fourteen examples of anthropomorphs with specific features that define the Black Rock Man and illustrate the premise of this paper.

Example One. I have somewhat subjectively chosen one image that appears to be a "type site" for the Black Rock Man. This figure is located in Millard County, which is near the center of the Black Rock Desert. Figure 3 is a photograph of the image. A sketch of the image is shown in Figure 4.

The defining characteristics of this anthropomorph are that both arms are upraised and the figure is holding a particular object in each hand. In the image's right hand is an object represented by a long broad line that is intersected by short broad lines that taper to a point on both sides of the long line. There are five short lines on each side of the long line and they are nearly opposite each other. The lower end of the long line appears to have a pointed feature attached to it, which presents the appearance of a spear. The figure appears to be holding the object near the end just above the spear, and it is holding it high in the air, partly over its head. In the figure's left hand there is a crescent shaped object, with five short lines protruding from the convex edge. These short

Figure 3. *Photograph of a petroglyph in Utah's Black Rock Desert, Millard County that typifies the Black Rock Man type image.*

Figure 4. *Sketch of the anthropomorph shown in Figure 3*

lines appear to be the tips of the fingers of the hand holding the crescent-shaped object. This, however, may or may not be a correct interpretation, because similar objects that are held in the hands of other anthropomorphs have more than five short projecting lines, so they might not represent fingers. This object is held up in the air as well. The anthropomorph also has what appear to be horns on its head, and there is a pendant attached to each side of the head, which probably represents an ear pendant, or perhaps, less probably, hair ties.

The nature of the physical objects that are being held in the anthropomorph's hands are uncertain; however, since they are held high by upraised arms and the figure's legs are spread wide, the attitude of the figure suggests a threatening stance. If this interpretation were correct, the implements would appear to be weapons. This further suggests that the image is one of a man and not a woman, since hostile actions exhibiting superior strength (note the horns) were most typically a man's realm. Other anthropomorphs in the eastern Great Basin appear with similar objects held in their hands, and occasionally with a few other objects as well.

Example Two. A somewhat similar anthropomorph is found farther to the west in the Black Rock Desert. It is illustrated in Figure 5 and a sketch of it is shown in Figure 6. The image is not as well made as the anthropomorph in the previous example, or those that follow. This may be the result of a hurried portrayal of the image and/or the skill of the artesan. This anthropomorph is holding an implement somewhat similar to the one shown in Figures 3 and 4. This implement is similarly represented by a long vertical line with a row of short horizontal lines intersecting it. Notice that the figure is holding this object in its left hand, as opposed to the figure shown in ex-

Figure 5. *Another image shown holding objects in both hands.*

Figure 6. *A sketch of the anthropomorph shown in Figure 5.*

ample one, which is holding the object in its right hand. Furthermore, both objects are held in the air, but not as high.

In the anthropomorph's right hand there is an object that has short lines protruding from its convex side. These lines are somewhat similar to those shown in Figures 4 and 5, but the object is not exactly a crescent shape. Instead, it is somewhat of a rounded triangular shape with outward curving sides, round edges, and it has about seven short lines protruding from the top of it. There are two unpecked areas on the interior of the object. The shape of the object and the two unpecked areas present the appearance of a head with hair and large eyes; however, this interpretation is entirely subjective and likely not what was intended by the artisan, given the portrayal of similar objects. This object is attached to the hand of the figure with a long broad line. The anthropomorph has horns on its head, as did the image in example one. The legs of this figure are also positioned similarly to the image in example one, in that they are spread wide, and both are pointing in the same direction. Notice that the image in Figure 5 is also lighter in color than other images in the panel and that there is additional superimposition of other lighter images, which indicates that this image and the others were created later.

Figure 7. *Anthropomorph from the Devils Kitchen site near Fillmore, Utah.*

Example Three. Figure 7 is a photograph of an image that is located at the Devils Kitchen site near Milford, Utah. Unfortunately, the panel is weathered and indistinct. Figure 8 is part of a field sketch I made when the site was re-documented in 2006 as part of the BLM's National Public Lands Day (Haines and McCarthy 2006). The figure is holding in its left hand what might be a crescent or oval shaped object with small projections on one side, similar to those described above. This object is so indistinct that its form is not clearly discernable. In its right hand is a somewhat triangular object that has two interior unpecked areas, similar to the one shown in example one (Figure 5). There are other appurtenances to the head, waist and arm.

Example Four. Figures 9 and 10 show another image at the Devils Kitchen site. It is in a more protected location in the basalt outcrop, so it has not suffered the full effects of weathering and thus it is more distinct. The figure has a tapering body that is crisscrossed with sloping lines. In its left hand, it holds an object illustrated by a long line to which is attached five or six short lines on the lower side. In its right hand, it holds an object that is somewhat of an oval that has five curving lines attached to the side away from the anthropomorph. The anthropomorph also appears

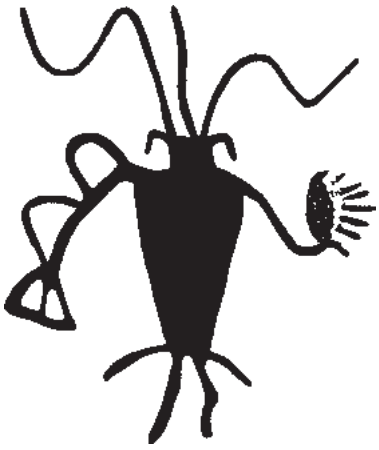

Figure 8. *Sketch of anthropomorph in Figure 7. Because this image is so indistinct, this sketch should be considered only as an approximation of the image. Not all of the detail surrounding this image is shown in this sketch.*

to have horns, similar to those described above. A pendant is attached to the base of each horn.

Example Five. Figure 11 is a photograph of an image that is likely the most well known of the anthropomorphs of the type illustrated here. It is located in Sevier County in Fremont Indian State Park. This anthropomorph also has horns and it holds an object in its left hand that is a slightly curving line with short pointed lines attached to each side, similar to others described above. In its right hand is an object somewhat similar to that shown in examples two and three (Figures 5–8). The object contains two unpecked areas and there are four short broad lines attached to it. The legs have a broad stance but feet are not illustrated. Notice that this anthropomorph has horns and perhaps broad shoulders.

Example Six. The panel shown in Figure 12 is located in Sevier County in the Clear Creek drainage. The panel contains an anthropomorph that has a crescent shaped object in each hand. One crescent is held up in the air and the other is held out from the body. In the other images described above the presence of a horned headdress is assumed. In this panel, however, the horns, if they are horns, appear to be depicted as a removable headdress.

Example Seven. Figure 13 is located in Sevier County in central Utah near the town of Richfield. The anthropomorphs are pictographs. Figure 14 is a sketch of one of the figures. Basalt outcrops are nearby, so it is still in the region of the Black Rock Deserts. The anthropomorph on the right

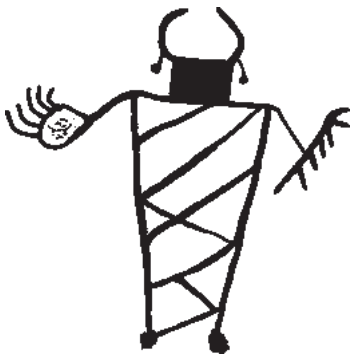

Figure 9. *A more distinct anthropomorph from the Devils Kitchen site near Fillmore, Utah.*

Figure 10. *Sketch of an anthropomorph from the Devils Kitchen site. All images and features in the panel is not shown here.*

Figure 11 . *A well-known and often photographed anthropomorph in Fremont Indian State Park, Utah.*

Figure 12. *An anthropomorph along the Clear Creek drainage holding a crescent shaped object in each hand.*

Figure 13. *The anthropomorph on the right is holding objects in its hand similar to those described in earlier examples.*

Figure 14. *Sketch of anthropomorph shown in Figure 13.*

side of the panel holds in its left hand an object that is somewhat triangular in shape and is similar to others described above; however, there are no unpainted areas inside of the object. In its right hand it holds an object shown by a long line from which are attached seven or eight short lines along its upper side. Notice that in example four (Figures 9 and 10) the short lines are attached to the lower side of the long line.

Example Eight. Figure 15 is a photograph of a red painted anthropomorph located in northwestern Utah. Figure 16 is a sketch of the image. It is located southwest of Salt Lake City, in Tooele County. In the anthropomorph's right hand is an object illustrated by a horizontal broad line with broad lines both above and below it, which are similar to those illustrated in examples one, two and five (Figures 3–6 and 11). In its left hand is an object that is similar to the one in the figure's right hand, but much shorter—there appear to be at least two vertical parallel lines bisecting a short horizontal line. There may have been more vertical lines; however, the area has been eroded and exfoliated so evidence of pigment is questionable. The anthropomorph has horns and accentuated shoulders. The waist is narrowed and the hips flare directly out from the waist. This style of illustrating anthropomorphs is found in several panels in the area, suggesting that they were all made by a single person or small group of people who lived here. The image displays an impression of

Figure 15. This pictograph is southwest of Salt Lake City, in Tooele County. Notice the accentuated physical form of the image.

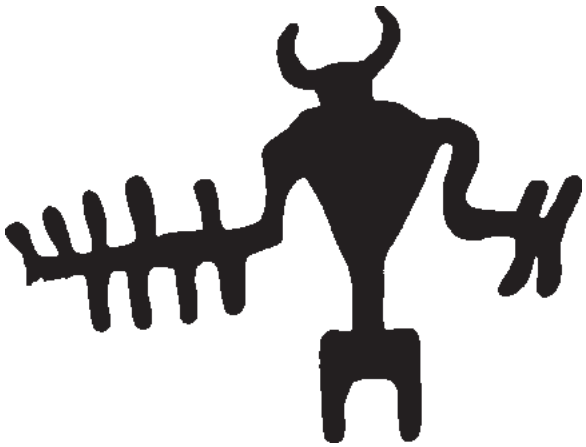

Figure 16. *Sketch of anthropomorph shown in Figure 15. Erosion of the image makes accurate sketching difficult.*

Figure 17. *Anthropomorph with crescent shaped object in its left hand..*

Figure 18. *Sketch of panel shown in Figure 17. The figure is weathered and indistinct so this sketch should not be considered an accurate reproduction of the image.*

superior strength, as if depicting a fearsome personage. These characteristics and the nature of the objects held in the hands of this figure again suggest a male and a male dominated activity like warfare.

Example Nine. Figure 17 is a short distance from Figure 15. The sketch in Figure 18 shows the image more clearly. In this anthropomorph's left hand is a crescent-shaped object that has a row of short lines projecting from it, which is similar to those shown above. Note that there are too many short lines attached to the object for them to represent fingers. This suggests that the short lines in the similar images shown above do not represent fingers. In its right hand, there appears to be a wavy club-like object. Notice also that this anthropomorph has horns on its head.

Example Ten. Figures 19 and 20 are in Box Elder County, which is in northwestern Utah north of the Great Salt Lake. This image holds in each hand an object represented by a long vertical line with shorter lines bisecting it. Note the similarity to the anthropomorph in Figure 16. Here again the objects are held in outstretched arms. The object in the figure's right hand appears to have four short lines bisecting it, and there is perhaps a hook-like attachment at the bottom. Perhaps this is in some way related to the spear-like attachment at the bottom of the object shown in example one (Figures 3 and 4). The figure's left hand holds an object that has five horizontal bisecting lines. It is holding it so that there are three lines above the hand and two below it. The image also appears to have horns on its head or a headdress indicative of horns. These horns are different from all those discussed above because they have an unpecked area inside. Note that parts of the figure are obscured by lichens.

Figure 19. *This panel is in Box Elder County in northwestern Utah north of the Great Salt Lake.*

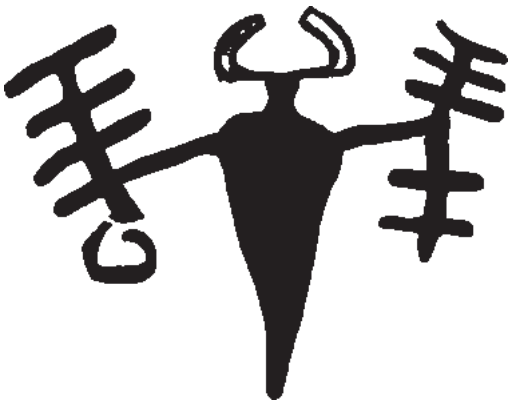

Figure 20. *Sketch of the anthropomorph shown in Figure 19.*

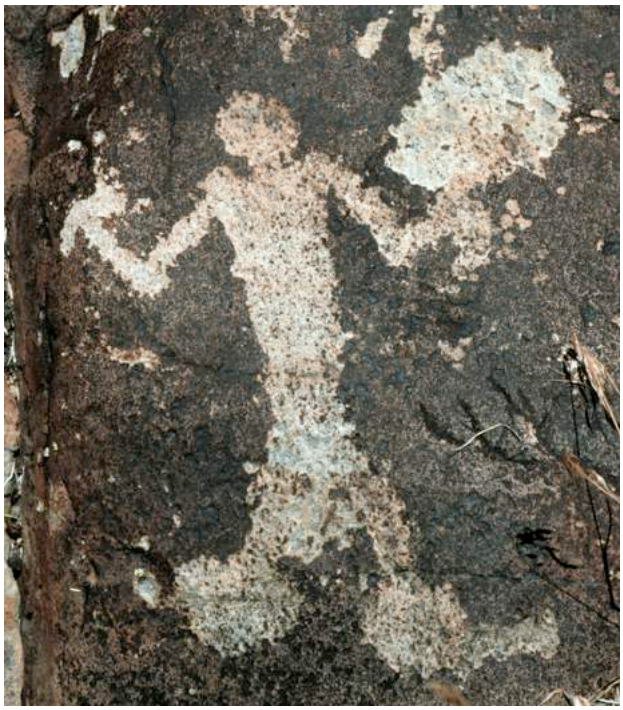

Figure 21. *This anthropomorph from Box Elder County appears to be holding a crescent in both hands.*

Example Eleven. Figure 21 is at the same site as Figure 19. It appears to hold a crescent shaped object in each hand. These objects are similar to those in the Clear Creek panel (Figure 12). Notice that both arms are upraised. This figure does not have horns.

Example Twelve. Figure 22 is a photograph of an anthropomorph recently located in Millard County. Figure 23 is a digitally enhanced image.

Figure 22. *Anthropomorph in the Black Rock Desert, Millard County*

In the figure's right hand is a somewhat circular object with short broad lines descending from the bottom of it and a narrower and shorter set of lines above it. It has a small pecked-out area in the center. In the figure's left hand is an object depicted by two somewhat-triangular objects connected to the figure's hand and to each other by a curving line. This object appears similar to a bola (bolas)—a cord with weights attached to the ends for throwing at and entangling an animal or a person. If that identification is correct, this might also suggest warfare. There are also two lines protruding vertically from the figure's head that may represent horns. Notice that the body also contains sloping lines similar to those shown in Figure 9.

Example Thirteen. Figure 24 is a photograph of an anthropomorph located in San Pete County near the town of Gunnison, Utah. In its upraised left arm it appears to be holding an object similar to the one shown in Figure 16. It consists of two broad lines close together. In its right hand, there is an object that is difficult to determine because of weathering. It appears to be a short, slightly curving line at right angles to the arm. This anthropomorph also has large curving pointed horns on its head.

Example Fourteen. Figure 25 is located in Box Elder County near the Idaho State line. It is the northernmost Black Rock Man. Figure 26 is a sketch of the figure. The anthropomorph has large

Figure 23. *This figure has been digitally enhanced by the author to more clearly show the details*

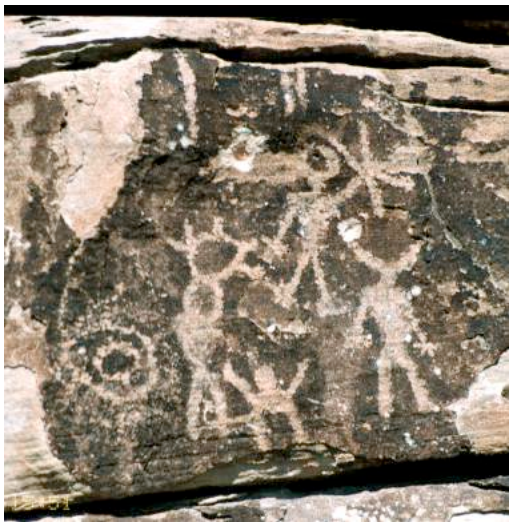

Figure 24. *An anthropomorph located in San Pete County near the town of Gunnison, Utah appears to also be holding an implement in its upraised arm.*

horns and it appears to be holding a short curved line in both its right and left hands. The object in its right hand has mostly been lost to erosion.

SUMMARY AND CONCLUSIONS

I have demonstrated here that there exists on the western side of the Wasatch Mountain range a dispersed collection of anthropomorphs that have characteristics which appear to be unique to that region. These images are holding distinctive objects in their hands. These objects are generally of two types. First is a long, often vertical line, generally intersected by short lines on one or both sides, which occasionally taper to a point. Second, is a crescent, or somewhat crescent-shaped object. These crescent shaped objects often have a row of short lines projecting from their convex side. Occasionally two interior adjacent unmodified areas are present that suggest the depiction of eyes. There are also a few other objects held in the hands of these anthropomorphs. Often these human figures have horn headdresses or lines attached to the head that suggest horns. Occasionally there are pendants on both sides of the head.

If the objects portrayed in the panels represent actual physical objects, then there must have been a physical purpose for their existence. Several characteristics in the images themselves and in the way they are portrayed suggest that they are physical weapons. It is not evident whether these objects were used offensively or defensively.

Figure 25. *is located in Box Elder County near the Idaho State line. The image with long horns appears to be holding a short curved object in both of its hands.*

Figure 26*. Field sketch of image shown in Figure 25.*

Some of the characteristics of these objects that suggest conflict are:

1. Many implements are held in upraised arms in a posture that appears to be portraying a threatening gesture.
2. Some implements have the appearance of having sharp ends, which would increase their effectiveness as weapons.
3. Some of the anthropomorphs holding the objects have exaggerated muscular features.
4. All but one of the anthropomorphs shown here have horns or two lines attached to the head that could represent horns, which perhaps represent animalistic strength. Several Native Americans have explained to me that horns represent power. Expanding that meaning to images created a thousand years ago has to be considered speculative, but it is possible nonetheless since these images may have been created late in the Fremont period.

The distribution of these objects and their context in prehistory has notable significance. They have been found only on the western side of the Wasatch Mountains. This is the region where it has been proposed that Numic people (Shoshone) arrived in Utah from the southwest. The appearance of these weapons (if that is what they are) in Fremont imagery in this region seems to suggest that there was conflict when these two cultures encountered each other.

Of course, it is also possible that this interpretation is incorrect and that the objects are abstract or ceremonial in nature. Whether these objects are physical weapons or not, or whether they are abstract or ceremonial or not, their distribution and their relative uniformity over nearly all of western Utah (along with their absence in eastern Utah) indicates that a difference in ideologies existed between the people on opposite sides of the Wasatch Mountain Range. Even if these objects, and the way they are portrayed, are not indicative of *any* of these ideas, then they certainly suggest a substantial difference in some type of activity, which still indicates a difference in ideologies. Unquestionably, rock art demonstrates that the Fremont existed in two separate socially bounded environments. The high and extensive Wasatch Mountain range that divides the two regions may have been responsible for this diversification by limiting contact and interactions to a short summer season.

A search for physical objects in the archaeological literature and in museums that might correspond to the depictions in the images has not yet been conducted. Information about the number and distribution of these images in the Black Rock Desert near Fillmore is a recent development due to the archaeological surveys that were conducted in 2003 in the Milford Flat Fire Rehabilitation Project conducted for the BLM on about 200,000 acres of wildfire burned land. Other images with these characteristics exist in this area, but I have not had the opportunity to visit them. I have only seen photographs of the images – they are not included in this report; however, their locations are shown in Figure 2.

It is interesting to note that over 50 years ago Jennings, et al. (1956) designated the area east of the Wasatch Mountains as Fremont and the area to the west of the mountains as Sevier Fremont. It was not too long after this date that the Fremont was divided into various other regions by other scholars; for example, Marwitt (1970), being likely the most well known, divided the Fremont into five regional variants. Now, with rock art as a source of new information, we are back to Jennings original conclusion – there are two major divisions of the Fremont. The division is, of course, an ideological division.

It is important to note that the Black Rock Man images provide important information about artifacts. Archeologists also study artifacts to explain prehistoric human behavior. Rock art has been, in a large measure, neglected in this regard. The typical artifact excavated from a Fremont site (ceramics, baskets, lithics, etc.) does not typically directly identify or characterize the ideological aspects of prehistoric human behavior. A crescent

shaped object or an implement like those described above buried in the ground is no longer in the actual context that it was in while it was being used. Although there may be some important information gained from an object's buried context, when the object is depicted in the context of its actual use, as in what is popularly called rock art, there exists a significantly greater amount of information about it. Rock art has the potential to determine more information about how the artifact was used and to provide a glimpse into the ideology surrounding its use. Rock art can thus be used to identify and define prehistoric ideologies and equally as important, define the physical boundaries of these ideologies, and likely how and why they changed over time.

Rock art also provides an opportunity to determine precisely where a specific individual lived or traveled (or a close-knit small group of people), during the period when he, she, or they were creating specific types of images. This determination is possible because different individuals have different artistic attributes characterized by factors such as artistic skills, interpretation of current ideologies, modes of expression, etc. This uniqueness also allows even a finer characterization of how ideologies were distributed across the prehistoric landscape and, more imprecisely at the present date, how they moved through time. Once we understand that these differences exist and can be identified, then we can attempt to understand and study them. This is one reason why all "rock art" must be preserved. We do not know today what may be important tomorrow.

As a final point: the data presented here is not intended to suggest that the Black Rock Man figures are the only rock art images that are unique to the western side of the Wasatch Mountains. Further research will likely discover other types or classes of imagery that exist only in this region. Certainly there are more of these Black Rock Man images in western Utah and eastern Nevada than I have seen. Perhaps there are even a few in eastern Utah. If you know of any others, I would like to receive information about them so that a clearer picture of their distribution, differences and context can be obtained.

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Lynda D. McNeil

HOPI *HU KATSINA* ICONOGRAPHY IN ROCK ART AND MATERIAL CULTURE: TRACING THE AVIAN SOLAR DEITY FROM FORMATIVE MESOAMERICA©

According to Hopi oral traditions, clans from central Mexico brought *katsinam,* ancient guardian spirits, with them to the Colorado Plateau (Ferguson and Lowa'omvaya 1999:79, Table 6; Kealiinohomoku 1989:52–53; Lyons 2003; Nequatewa 1967). Jane Young and other scholars point out striking similarities between Puebloan and Mesoamerican ideology and iconography, including "anthropomorphized deities" depicted on pottery and rock art with the Katsina Cult, ca. A.D. 1300 (Young 1994:107–108, check her references). However, to date they support the claim that evidence of precursors of kachinas and their iconography have not been identified in the rock art of the Colorado Plateau (Schaafsma 1994:65; Schaafsma and Schaafsma 1974). Alternatively, some scholars present limited evidence that populations in the Southwest represented "anthropomorphized deities" in pottery and rock art before the Kachina Cult, ca. A.D. 1300s (Crown 1994:218; also see Anderson 1955; Cole 1996, 2009; Ellis and Hammack 1968; Parsons 1933, 1936; Thompson 1994).

Expanding upon Hays-Gilpin and Hill's (1999, 2000) Uto-Aztecan (UA) Flower World Complex research, this paper attempts to extend the database of Flower World iconography to include one of several anthropomorphized deities (*katsinam*) that harken back to Formative Otomanguean ("Olmec") maize religion. It explores the cultural transmission and modification of the avian solar (sun-eagle) deity that is represented in multiple media in material culture spanning Basketmaker II/III, Fremont, Ancestral Puebloan, and present day Hopi cultures. I argue that the UA Flower World religion, an adaptation of Formative "Olmec" maize religion cultural traits (memes), was culturally inherited along with maize agriculture, spreading temporally and geo-graphically to populations representing various archaeological cultures on the Colorado Plateau.

MESOAMERICAN MAIZE RELIGION[1] (OVERVIEW)

I am arguing that this previous body of work overlooks the congruence of Western Puebloan anthropomorphized deity iconography depicted in multiple media with that of the Old Uto-Aztecan (UA) Flower World Complex (Hill 1992). Originating in the western coastal Sierra Madre Occidental corridor, the UA Flower World Complex adapted a pan-regional Formative Otomanguean ("Olmec") maize religion that diffused from Central Mexico ca. 1500 B.C. Moreover, the reason scholars have not recognized anthropomorphized deities (*katsinam*) in Ancestral Puebloan material culture on the Colorado Plateau is due to their having undergone meme mutations over time.

From Formative western "Olmec" culture (Central Mexico), anthropomorphized deity[2] iconography (specifically, maize, sun-eagle, and rain-bird wing) diffused by way of Southern Uto-Aztecan (SUA) and Ancestral Hopi immigrants to the Colorado Plateau (lower San Juan River and Little Colorado River drainages), and appears in Western Basketmaker II material culture, including rock art (Cole 2009:25–27). In a longer companion paper (McNeil 2010a), I reconstruct the social (macro-processes) and cognitive (micro-processes) involved in the cultural transmission of Otomanguean ("Olmec") maize religion. Formative Olmec (Otomanguean) maize religion, with its iconic suite of

"anthropomorphized deities," diffused to Southern Uto-Aztecan (SUA) speech communities inhabiting Sinaloa-Sonora, ca. 1500 B.C. Certain SUA communities with genetic and linguistic ties to Otomanguean speech communities in Central Mexico (Merrill et al. 2009:21021) adapted this maize religion and iconography (Marcus 1989:150; Niederberger 1996; Pool 2007; Taube 1996, 2000), thereby constructing their own religious belief system, the Old UA Flower World Complex (Hill 1992).

While to date most archaeologists agree that Chapalote maize first appears in Arizona and New Mexico ca. 2100 B.C. (LeBlanc 2008; Mabry 2005, 2008; Merrill et al. 2009:21019), the method and timing for its diffusion is still under debate (Merrill et al. 2009:21025; Bellwood-Hill hypothesis in Hill 2001, 2006). Notably for this study, however, the sites in which an earlier, less-productive race of Chapalote appears were understandably devoid of evidence of Mesoamerican influences, given that it preceded the northern diffusion of Formative Otomanguean religion (Merrill et al. 2009:21022). Instead, this paper focuses on the subsequent Basketmaker II phase (ca. 1000 B.C. to A.D. 400) diffusion and the in situ coevolution of more productive variety of maize, *Zea mays, L*. (Doolittle and Mabry 2006:116, Table 8-3, 118; Simms 2008:201, Figure 5.4, 204–206) and Mesoamerican maize religion in the region from Sinaloa-Sonora to the Mogollon Rim (Carpenter et al. 2002:252, Figure 16.4 map).

ORIGIN OF OLD UA FLOWER WORLD

SUA and ancestral Hopi groups inhabiting the western coastal Sierra Madre Occidental corridor ca. 2500 to 1500 B.C. appear to have acquired and modified Formative Otomanguean ("Olmec") ideology and iconography (Marcus 1989:150–151, 153) into their own belief system, thus creating the Old Uto-Aztecan Flower World Complex. Linguist Jane H. Hill (1992) attests to the antiquity of the Old Uto-Aztecan Flower World belief system and iconography, positing that the Complex probably first appeared in an "Old Uto-Aztecan language family speech community—perhaps not the proto-community itself, but certainly communities that date to a very early period, in which the Hopi, and perhaps some of the Takic groups, were still in contact with a proto-southern Uto-Aztecan community" in western coastal Mexico (Hill 1992:126; Hill 2001).

Weighing the possible origins of this ancient Flower World Complex based upon SUA (Pima, Yaqui, Tohono O'odham) song imagery, Hill (1992) considers two hypothetical scenarios: (1) its origin in southern Mesoamerica, "diffusing into the Old Uto-Aztecan community along with agriculture" (ca. 1500 B.C.); or (2) "a foundational complex with associations of flowers with fire, spiritual power, and the land of the dead" developing among Old Uto-Aztecans, and being elaborated into the full Flower World complex in Mesoamerica, spreading south to the Mayans, and north to Western Puebloans (Hill 1992:127).

Old Uto-Aztecan Flower World Complex

In this section, I argue that the Old Uto-Aztecan Flower World Complex reflects the first scenario proposed by Hill (1992), that is, SUA borrowing cultural traits from Otomanguean ("Olmec") maize religion, followed by their diffusion ca. 1200 B.C. into the U.S. Southwest. While chromaticism associated with natural phenomena (e.g., nacreous shell, magnetite mirrors, rainbows, etc.) is central to both Olmec and Flower World complexes, anthropomorphized nature deities are typically implied in SUA and Hopi oral traditions. These nature "spirits" or "vital forces," associated with the realms of "earth" and "sky" (e.g., sun, rain, lightning, thunder, earth and its agricultural products) are often regarded in kinship terms or as ancestors in Formative Otomanguean religion (Marcus 1989:150–154, 193). Similarly, in Western Puebloan (Hopi) religion "beneficent spirit beings" (*katsinam)* correspond to clan

affiliations (e.g., *Taawangyam* [Sun Clan], *Patkingyam* [Water Clan], *Qa'ongyam* [Mature Corn]) and act as guides who advise the people regarding how to lead an ethical life (Sekaquaptewa and Washburn 2001:470).

A plausible reason for the tacit reference to nature deities in the Old Uto-Aztecan Flower World songs may pertain to their primary role as first-person narrators and spiritual advisors. Reflecting the taboo in middle range cultures against uttering the name of a sacred being, often *katsinas* are only referred to metaphorically in *katsina* songs (Barber and Barber 2004:19). For example, in Uto-Aztecan Flower World songs from the Yaqui, Tohono O'odham, and Pima, anthropomorphized nature deities or spirit beings (Deer, Gopher, Corn Man, Rain-Cloud Maiden) act as first-person narrators, usually only mentioned explicitly in the song's title (Eggan 1994:9; Hill 1992:123–126).

Similarly in the Hopi Flower World religion, while *Máasaw* (deity of Earth, Life, Death, and Fire) and *Muy'ingwa* (god of Germination) are mentioned explicitly, anthropomorphized nature deities (e.g., Maize, Rain) are typically referred to only metaphorically in Hopi *katsina* songs. For example, during *Powamuya,* the spring purification and planting rites, "The pouring water metaphor is a reiteration of the idea that *katsinas* are clouds that [in reciprocity for Hopi hard work by hand; phrase inserted] pour their water on the fields" (Sekaquaptewa and Washburn 2001:468, Song 81) and "Their dipper of water, from there, they will pour, to you, here" (Sekaquaptewa and Washburn 2001:471). Embodying this metaphor during *Powamuya*, the *Hahai-i Wu'ti Katsina* ("Pour Water Woman") douses the children with water in the open plaza pre-Katsina Initiation rites.

NORTHERN TRANSMISSION OF "OLMEC" RELIGION

Formative "Olmec" maize religion diffused from Otomanguean to Uto-Aztecan speakers ca. 1500 B.C., a period of major influx of Mesoamerican influence on SUA groups inhabiting western coastal Sierra Madre Occidental (Marcus 1989:148; Schaafsma and Taube 2006; Taube 1983, 1996, 2000). Distributed throughout Central Mexico (Oaxaca, Guerrero, Morelos, Puebla, Basin of Mexico), it represented pan-regional beliefs and ritual practices shared by Olmec Otomanguean and Mixe-Zoquean speakers (Hopkins 2006:612; Marcus 1989:150; Marcus et al. 1983).

Formative Zapotec scholar, Joyce Marcus, identifies the core beliefs and associated "mythico-symbolic deities" as those natural and supernatural "forces" related to lightning, rain, earth, and the ancestors who reside in caves or springs (1989:151–152). Iconography related to these natural forces (or "deities") and to the earth's four directions appeared on incised jadeite celts, funerary ceramics (which fall into two types along lines of deity-kinship affiliation), and on Mixtec codices. Other "Olmec" highly chromatic and symbolically significant objects produced in household craft industries, such as pectoral pendants worn by elites (priests, chiefs), included magnetite mirrors (San José Mogote) and *Spondylus* (pearl oyster) shell (Teopantecuanitlá Oaxaca) ca. Tierras Largas, 1400 to 1150 B.C., the San José Mogote 1150 to 850 B.C., and in the Basin of Mexico (Coapexco and Tlatilco in Tolstoy [Marcus 1989]). Similar ritual objects have been recovered at early Hohokam horizon sites in Arizona (Bayman 2001:268).

The Old Uto-Aztecan Flower World Complex, therefore, may represent a secondary elaboration (or restructuring) of a pan-regional Early Formative "Olmec" (ca. 1600 to 1200 B.C.) shared belief and representational style (Lesure 2004:74–75, 89–91; Marcus 1989:152–153). The diffusion of this SUA religion, iconography, and related ritual paraphernalia would have occurred primarily through macro-processes or social pathways, such as interregional exchange, intermarriage (haplogroup A distributions among SUA populations), and bilingualism

(Otomanguean loan words in SUA maize lexicon) involving western "Olmec," Oaxacan, and other Otomanguean speaking communities in Central Mexico (Hill 2006:634; Merrill et al. 2009:21021). (See Figure 1.)

Based upon inferences drawn from the correlation of genetic and linguistic evidence, as well as from San Pedro-Western Basketmaker II phase archaeological evidence (Berry and Berry 1986; Charles and Cole 2006; Matson 1991, 1999, 2005), one can infer the following scenario:

- Otomanguean speaking men co-resided or intermarried with SUA and Ancestral Hopi women;
- Subsequently, these marriages developed bilingual communication, providing the vehicle for the oral transmission of Olmec maize religion (i.e., beliefs and representations in oral tradition and material culture) to SUA and Ancestral Hopi speech communities, initially on an individual scale, and have been identified in Old UA Flower World Complex song imagery (Hill 1992) and in U.S. Southwest material culture and iconography, as early as Western Basketmaker II culture, ca. 1000 B.C. to A.D. 400 (Cole 2009:25–27) (See Figure 2).

Western and Eastern Basketmaker II cultures represent distinct populations, as Steven Simms explains, "Basketmakers were not all of a cloth and had local peculiarities of lifeway. They varied in ethnic and linguistic identities that developed for centuries before there were any traces of farming north of the Colorado River" (Simms 2008:198).

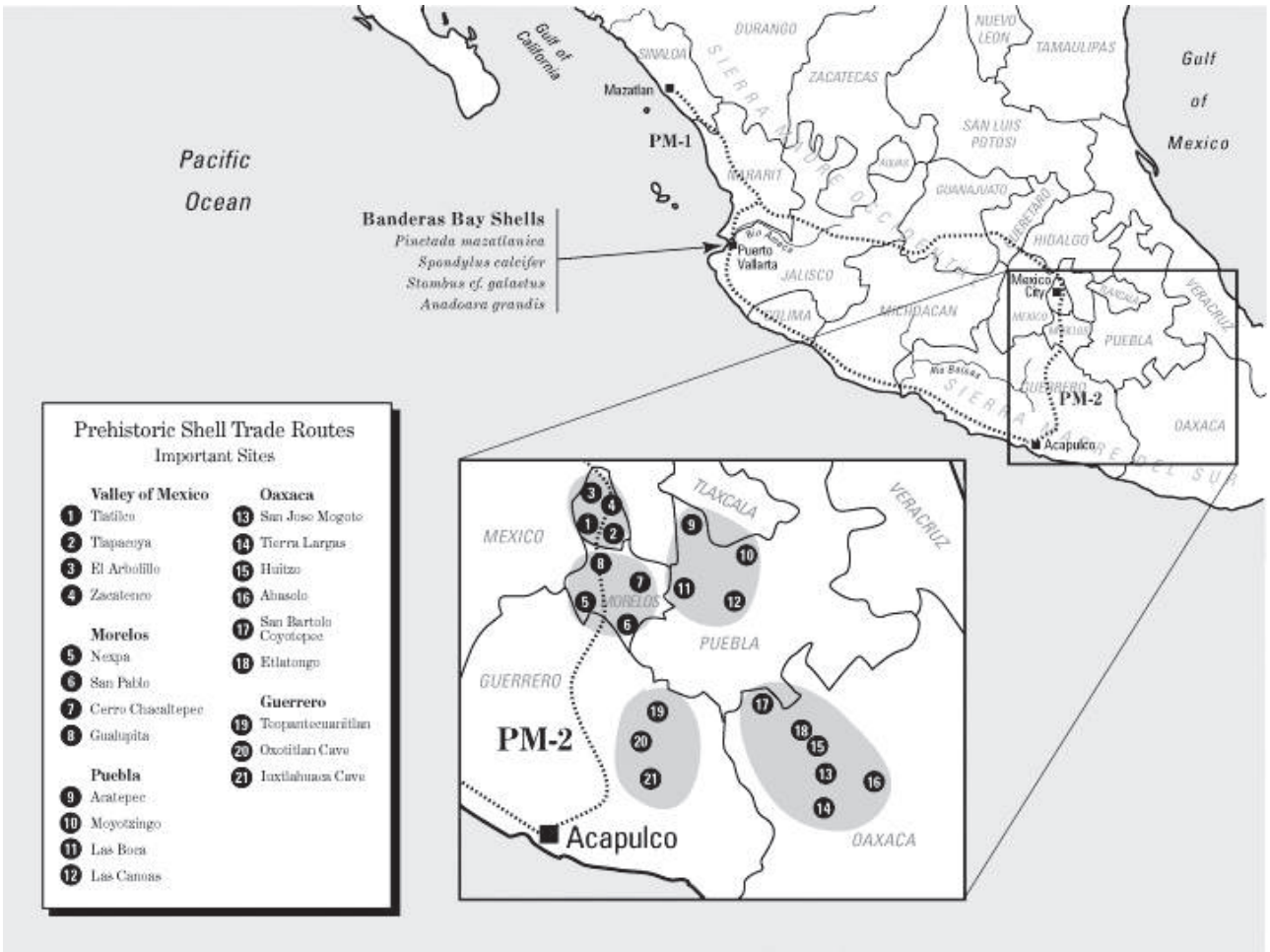


Figure 1. *Trade Map of Central Mexico during Formative Period.*

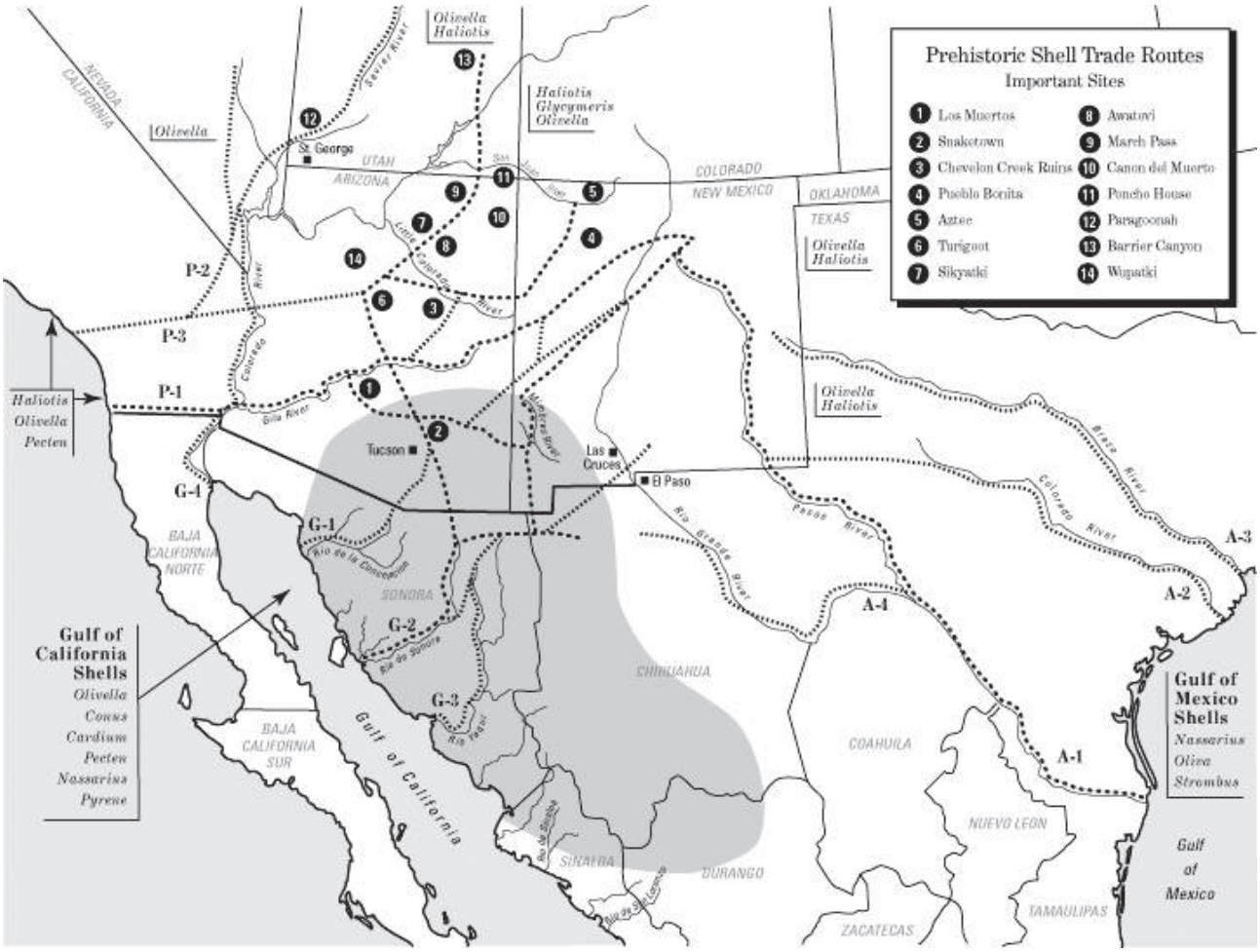


Figure 2. *Trade Map of Sonora and U.S. Southwest during Early Agricultural Period.*

UA FLOWER WORLD AND CULTURAL MEMES

Like an "environmental mosaic model" for the spread of maize in the U.S. Southwest (Doolittle and Mabry 2006:118), Formative maize religion's "cultigens" or "memes" (Dawkins 1990) took root and evolved in localized cultural "micro-environments" that included maize farming (alluvial fans, etc.). Just as maize varieties appear to have evolved in geographic isolation (Doolittle and Mabry 2006:116), maize religion memes (e.g., representations of deities) within a given archaeological culture display local stylistic traditions distributed within a limited area. For example, a number of varieties of Basketmaker II stylistic traditions have been identified: Palavayu "Majestic" Basketmaker II style on the Middle Little Colorado drainage in east-central Arizona; San Juan Basketmaker II style on the lower San Juan River in southeastern Utah; and Abajo-La Sal Basketmaker II/III style in the Abajo and La Sal Mountain area of eastern Utah.

This section focuses on cultural transmission (learning) between individuals, which is then transmitted to the group (Bettinger 2008:2–3). Anthropologist Pascal Boyer's cognitive approach to religious ontology sheds light on combined "culturally evoked" (universal, innate capacities) and "culturally acquired" cognitive micro-processes involved in the cultural transmission of religious ideas and representations (Boyer 1998:876). [In the past, anthropologists have assumed that religious ideas were either universal or empirical (*in situ*).] UA Flower World religious

ontology and iconography, including anthropomorphized deity representations, reflect predictable social and cognitive processes of variation or meme mutation during cultural transmission.

According to Boyer, "micro-processes of cognition and interaction impose strong constraints on the diffusion and transmission of religious assumptions, thereby leading to the recurrence of ideas (or representations) observed in the religious domain" (Boyer 1994:876). Put simply, the religious knowledge domain is unique in that it combines: (1) universal, intuitive (INT) principles (innate capacities, e.g., categorizing, reciprocal behaviors among kin), and (2) culturally acquired (remembered, transmitted) counterintuitive (C-IN), attention-grabbing assumptions that violate normal expectations.

Within these constraints, one can make "meaningful predictions about cultural fitness" or recurrence of religious representations, explaining how culturally acquired religious ontology, expressed in mental and material representations, gains its "staying power" (or "recurrence above chance") (Boyer 1994:404–407, 1998:885). First, these representations are grounded in universal (innate) principles of human intuitive ontology (e.g., categorizing, inference drawing). These intuitive principles provide the structure (analogous to computer hardware) for human assumptions and expectations, which are, in turn, fleshed out by cultural input (analogous to computer software). Under certain circumstances when non-intuitive (or counter-intuitive) assumptions are not successfully transmitted, these intuitive principles are predictably activated by default.

To give an example, cross-cultural folk biology (taxonomy) categorizes specific species of birds (e.g., ravens, *corvides)* in the BIRD knowledge domain, although any given cultural/ecological context restricts the kinds of plants included in the category. In forming a culturally-specific religious ontology, these intuitive (INT) assumptions combine with "attention-grabbing" counter-intuitive (C-IN) assumptions (correlated with better memory storage) that violate intuitive ontological categories. For example, a religious ontology takes form when the intuitive, subordinate category EAGLE> BIRD is combined with the SUN> CELESTIAL OBJECT category (compressed by association, Barber and Barber 2004:248), and then are conflated with the PERSON category, which captures human agency and biological needs. Taken as a conceptual unit, the "INT plus C-IN" assumption, SUN-EAGLE + PERSON (= DEITY), violates ontological assumptions about BIRDS, yet in doing so increases the chance that this assumption will be acquired, recalled, and culturally transmitted. Consequently, this anthropomorphized avian solar deity concept and its material representations combine universal intuitive principles with counter-intuitive, culturally acquired assumptions that, in part, violate these principles. By joining INT with C-IN assumptions, these types of representations predict for their "cultural fitness" or recurrence during the process of transmission between individuals and culturally-related groups.

What happens, however, when an individual artist forgets or lacks direct exposure to the Olmec religious representation of the avian solar deity as a "feathered circle"? In this case, the "INT plus C-IN" assumption predictably defaults to the intuitive or locally observed, naturalistic principle (e.g., UA Flower World "sunflower" motifs), which is hardwired in human cognition (Barber and Barber 2004:19, 22, 245; Boyer 1998:878–879, 2001:89**)**. In this case, the default activates the intuitive domain—such as a subset of circular shapes—which would have been restricted to natural phenomenon known to SUA artists or singers in ecological context, such as "sunflowers" or "sunbursts."

SUN-EAGLE DEITY HEADDRESS MOTIFS

Like the Uto-Aztecan Flower World Complex, Otomanguean ("Olmec") religion involved the worship of anthropomorphized nature deities identified by headdress motifs (Marcus 1989: 151–152, 154). One of the leading Olmec nature deities was the "Bird Monster" or crested harpy eagle (*Harpia harpyja*) (Diehl 2004:102, fig. 64; Taube 2000:304). As discussed earlier, the Olmec avian solar (sun-eagle) deity motif conflates sun and crested harpy eagle images, the latter being a large raptor indigenous to central Mexican tropical forests (Joralemon 1971:67–70 on God III; Taube 2000:303, Figure 6). The Sun-Eagle (or crested harpy eagle) deity, represented in Early Formative Olmec material culture, ca. 1500 to 1200 B.C. diffused north, via the social pathways mentioned earlier, to SUA and Ancestral Hopi speakers living in western coastal Sinaloa-Sonora (Mexico). There it is was adapted (modified) into the Old Uto-Aztecan Flower World Complex before emerging along the Little Colorado River and San Juan River drainages with Basketmaker II culture ca. 1000 B.C. (Table 1:a[1] to a[3]).

Sun-Eagle Meme Mutation

Uto-Aztecan Flower World ideology and iconography reflect a predictable process of default activation from Formative Olmec deity representation and its meta-representation or symbolic meaning to intuitive principles. According to Deborah Washburn, mutations in imagery reproduced from memory occur either due to a lack of direct exposure to the imagery (e.g., the harpy eagle, which is not found in western coastal Sierra Madre Occidental corridor) or due to a lack of cultural knowledge important to understanding of the correct reproduction of the imagery (e.g., the feathered circle representing an avian solar deity) (VanPool, et al. 2008:80; Washburn 2001:77–83;). The C-IN representation of the "featured circle," symbolizing the avian solar deity (crested harpy eagle), predictably defaults to the domain of analogous circular objects with radiating "spokes," such as the "sunflower" or "sunburst" motif.

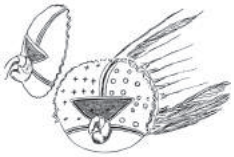
As scholars studying the Flower World Complex in material culture and iconography of the U.S. Southwest have attested, ubiquitous "sunburst" and "sunflower" imagery are often stylistically difficult to decipher (Ellis and Hammack 1968, in Hays-Gilpin and Hill 1999:9–10, Figures 4a and 4c; Kidder and Guernsey 1919). For example, "sunflower" and "sunburst" imagery has been cross-referenced in descriptions of imagery in Hohokam, Salado, Sinagua, Mimbres, Mogollon, Chaco, and Hopi (Pueblo IV) material cultures (Hays-Gilpin and Hill 1999:22–23; and Crown 1994:150, 158 on Salado pottery iconography).

It is reasonable to infer, then, that the Flower World Complex's focus on "sunflowers" suggests that default to the intuitive (i.e., from sun-eagle as feathered circle to sunflower or sunburst) occurred during horizontal transmittal from Otomanguean to UA individuals and communities. Conversely, in cases where individuals in certain groups (e.g., Hopi, Zuni) more accurately reproduced feather-circle images over time, it is probable that these artists experienced sustained exposure to representations or to cultural knowledge that connected the feathered-circle image with an avian-solar deity.

ROCK ART: SUN-EAGLE ICONOGRAPHY

On the Colorado Plateau, the earliest recognizable iconographic evidence of the feathered circle or "rayed" headdress motif appears along the Middle Little Colorado River drainage (Chevelon and Silver Creeks) on anthropomorphs in early Basketmaker II "Palavayu Majestic Style" rock art, ca. 1000 to 500 B.C. (Table 1:b[1] and b[2]) (Conkey and Hastorf 1990; McCreery and Malotki 1994). These early Basketmaker II figures wearing "rayed" headdresses appear at sites with stylistically similar anthropomorphs wearing "maize leaves or v-clef," "bird-wing," and "rain-

Table 1. *Sun-Eagle Deity Iconography*

Formative Olmec 1600 to 1100 B.C.	 a[1]  a[2]  a[3]
Basketmaker II 1000 to 500 B.C.	 b[1]  b[2]
Fremont A.D. 500 to 1200	 c[1]  c[2]  c[3]
Hopi A.D. 1899 to 1905	 d[1]  d[2]  d[3]  d[4]

(a1) Olmec avian solar deity, crested harpy eagle (Harpia harpyja), Mesoamerican lowland tropical forests; (a2) Oxtotitlan cave (Guerrero, Mexico) painting, feathered circle image (Grove 1970:Figure. 21, cited in Taube 1983:171 Figure 23b); (a3) owl or eagle with rayed (possible mosaic mirror) headdress, after Codex Bodeley, Plate 36, cited in Taube 1983:171 Figure 22b; (b1) Majestic Basketmaker II petroglyphs, Middle Little Colorado River drainage (photo by Jim McNeil); (b2) Majestic Basketmaker II petroglyph, Middle Little Colorado River drainage, Bellbottom site, drawing by Bernie Jones; (c1) Fremont style petroglyph, Steinacker Reservoir, northeast Utah, in Castleton 1984:33, Figure 2.37; (c2) "The Three Kings" panel petroglyph, Ashley Dry Fork, Castleton 1984:18, Figure 2.6; (c3) Uintah Fremont style, Dinosaur National Monument, Cole 2009:253, Figure 109A; (d1) Ahu'l Katsina mask (Oraibi), Stephen 1936:163 Figure 94; (d2) Ahu'l Katsina drawing by Hopi artist (Walpi), Fewkes 1903:124; (d3) Tawa (Sun) Katsina, Joseph J. Mora watercolor 1905, Smithsonian 1979:Cat. #264538; (d4) Ahu'l shield image, Fewkes 1899:Plate 25.

fringe" headdress motifs (McNeil 2008, 2010a, 2010b). In contrast, Uintah Basin Fremont Classic Vernal style rock art figures, ca. A.D. 900 to 1300, are depicted with a variety of meme mutations (or innovations) of the "rayed" headdress motif (e.g., rayed "crown"), while holding "rayed-sun" or "feathered circle" shields, often with "trophy heads" (Table 1:c^1 to c^3). These Fremont mutations of UA Flower World "sunburst/ sunflower" headdress motifs suggest that Flower World cultural traits (memes) diffused horizontally from UA speakers to Fremont (non-kin) groups, possibly Kiowa-Tanoan speakers (Hill 2008; Simms 2008:202,206), who had adopted and modified UA Flower World iconography and possibly ideology.

Unlike Uintah Basin Fremont artists, Ancestral and Historic Hopi produced fairly accurate replications of the feathered circle motif, such as the sun *katsina*, *Ahü'l's* headdress and its representations in multiple media (Fewkes 1899:Plate XXV a,d, 1903:124, Plate VII; Stephen 1936:163, Figure 94), katsina doll (*tihu*) (Voth 1901:Plate LIX b.c,d), feathered sun shields (Ferguson and Schachner 2003:138, Figure 30; Fewkes 1900:Plate LX, 139, Table 16 on sun shield in Hopi ceremony), and numerous depictions on kiva murals (Smith 1952) and altar screens or altar boards (Stephen 1936:297, Plate X, 299, Plate XI on *Pa'lülükona* curtain, 337 altar board), and water color painting of *Tawa Katsina* (Smithsonian 1979:Cat. no. 264538) (Table 1:d^1 to d^4). While sustained exposure to feathered circle imagery may account for accurate reproductions up to the present, the original avian solar deity meaning, which depends upon knowledge of Olmec ideology appears to be only tacitly understood, if not lost entirely.

Hu (Tunwap) Katsina Headdress Motifs

The process of meme mutation is apparent in the *Hu* (Oraibi) and *Tunwap* (Walpi) "Whipper" *katsina* headdress motifs over the period of settlement of Hopi First and Third Mesas. Initially, the *Hu katsina* headdress motif most likely represented a secondary elaboration of the Hopi sun deity (*Ahu'l*) feathered-circle motif headdress, to which a crescent moon or "two horn" motif had been appended (Table 2:d^1 to d^2). The Oraibi style *Hu Katsina* headdress reflects the mnemonic process of elaboration by combining solar and lunar referents related to the Hopi ritual calendar. Specifically, the horizontal crescent moon that precedes the vernal equinox (Stephen 1936, Vol. I:239, note 1; Vol. II:1010, Figure 495) signals the beginning of Hopi *Powamuya,* the spring purification and planting rites. The *Hu Katsina* headdress style, therefore, combines the sun-eagle (feathered-circle) motif with late February horizontal crescent moon. As evidence of the connection between the *Hu Katsina* and the avian solar deity, Fewkes includes the image of the "big horn solar god" wearing the *Hu Katsina* headdress in his article about the Aalósaka Cult (Fewkes 1899:Plate 25b).

In its traditional form at Oraibi, the *Hu Katsina* representations have side extensions that resemble the "horns" of the horizontal crescent or "moist moon" (*Powa'müriyawû*). The *Hu Katsina* with traditional (Oraibi, Third Mesa) headdress is depicted in multiple media, for example: as *katsina* doll (*tihu)* (Voth 1901:Plate LIX b, c, d), on the Katsina Initiation sand mosaic at Oraibi (Voth 1901:Plate LII, Figure 8 a–f, Plate LXII a, and Plate LXIX b), on the *Powamuya* Altar (Voth 1901:Plate XXXVIII); and on the Hopi *Niman* altar cloth (Stephen 1969:Figure 314) (Table 2:d^1 to d^5). In contrast at Walpi, *Tunwap,* the First Mesa form of the *Hu Katsina*, wears a headdress showing horizontal (etic) modification with up-curving "bison" horns (Cole 1989:Figure 3a; Fewkes 1903:124, Plate VII [Hopi drawings of *katsinam*]; Voth 1901:Plate 73).

While *Hu* (Oraibi) or *Tunwap* (Walpi) K*atsinas*' role in open plaza crying rites remains unchanged, the iconic mutation that took place during imagery reproduction by artists at Walpi reflects the infusion of cultural knowledge from the eastern

Table 2. *Hu (Tunwup) Katsina Iconography*

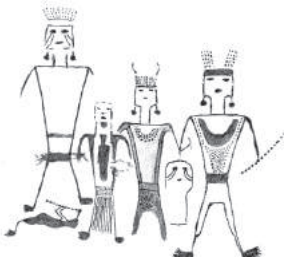
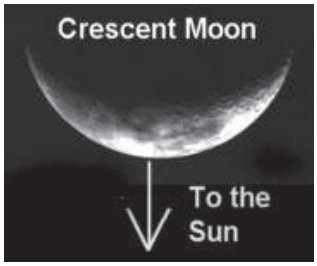
Basketmaker III A.D. 500 to 700	 a[1]  a[2]
Fremont A.D. 500 to 1300	 b[1]  b[2]  b[3]  b[4]
Late Pueblo IV A.D. 1375 or 1400 to 1540, 1628 Hopi	 c[1]
Hopi A.D. 1628 to present	 d[1]  d[2]

Table 2. *Hu (Tunwup) Katsina Iconography (continued)*

Hopi A.D. 1628 to present (continued	d[3]  d[4]  d[5]  d[6] 

February horizontal crescent moon prior to Vernal Equinox (3rd week of March). (a1) Moab, Utah 42GR408; (a2) Moab, Utah 42GR318; (b1) Flicker (Colaptes ssp) feather headdress, cal. A.D. 996 to 1190, Mantles Cave (5MF1), in CU Museum; (b2) Ferron Box, Castleton 1984:115, Figure 3.8; (b4) Willow and Hill Creek, Castleton 1984:80, Figure 2.118; (b3) Ashley Dry Fork site #1, Castleton 1984:21, Figure 2.10; (b4) Moab Golf Course site, Castleton 1984:80, Figure 5.51; (c1) Possible Hopi Hu and Hahai-i Katsinam, Awatovi, kiva mural, room 788, Smith 1952:297, Figure 27(l), Figure 80(a); (d1) Powa'müriyawû (February "moist" moon); (d2) Broad Face (Hu) Katsina mask (incomplete), drawn from Stephen (1936), Vol. 1:240, Figure 147; (d3) Hopi Hu and Hahai-i Katsinam, Katsina Initiation sand mosaic, Voth 1901:Plate LII; (d4) Water color painting, Joe Mora 1904-1905, Smithsonian 1979:Cat. #D264511; (d5) Hopi Tunwup Katsina painted on altar cloth for 4th day of Niman, from Stephen 1969:Figure 314; (d6) Tunwup Katsina twins (Walpi), Fewkes 1903:124.

Pueblos. Later, during the horizontal transmission with the migration of non-kin Tewa speakers to First Mesa, subtle modification of the *Hu Katsina* headdress' crescent horns occurred as a result of default activation or innovation (Table 2 d[6]). At Walpi, *Powamuya* coincides with the February women's Buffalo dances (Stephen 1936:239). By depicting the "crescent moon" element of the headdress as a "bison-horn," the Walpi artist most likely possessed cultural knowledge related to February bison dances from the nearby Eastern Pueblos (Stephen 1936:239).

In the rock art medium, the traditional ("crescent moon") *Hu Katsina* headdress motif appears in Basketmaker III (ca. A.D. 500–700) Style rock art (Moab, Utah) (Table 2: a[1] and a[2]) and at Pictograph Point, Mesa Verde (Olsen 1985:28, Figure 4). Moreover, the *Hu Katsina* headdress motif (Moab, Utah) closely resembles the red- and yellow-shafted flicker (*Colaptes spp*.) feather headdress (Table 2:b[1]), recovered from Mantle's Cave in Dinosaur National Monument (Burgh and Scoggin 1948:38, Plate 13) and radiocarbon (cal.) dated to A.D. 996 to 1190 (Truesdale 1996:30–

31). Using a pair of magpie or raven (?) tail or wing feathers putatively to represent the arc of the "crescent moon," the flicker headdress reflects, in my view, the process of horizontal transmission from Basketmaker immigrant farmers to indigenous foragers[3]. Examples of varying degrees of mutation of the BM III "solar-lunar" headdress motif (Table 2:a[1], a[2]) appear in Fremont style anthropomorphs at Ferron Box, McConkey Ranch, and Moab, Utah (Table 2:b[2] to b[4]).

The identification of *Hu Katsina* headdress imagery in Basketmaker III style and Ancestral Hopi petroglyphs and material culture suggests that they observed planting rites timed in conjunction with the crescent moon around the time of the vernal equinox (Ferguson and Lowa'omvaya 1999:128 on *Powamuya* as a solar-lunar ceremony). Also apparently related to planting rites, the Sundagger Site (ca. A.D. 900–1300) on Fajada Butte in Chaco Canyon has been identified as a solar-lunar calendar (Sofaer 2009). Watson Smith (1952) identifies a possible Hu Katsina headdress at Awatovi, kiva mural room 788 (Table 2:c1). After the coalescence of migrating peoples on the Hopi Mesas, post-A.D. 1628, the *Hu Katsina* would figure centrally in *Powamuya* open plaza ceremonies, as well as in kiva *Katsina* Initiation rites (Stephen 1936; Voth 1901).

CONCLUSION

This paper addresses the claim that *katsina* iconography is non-existent (or unrecognized) on the Colorado Plateau prior to A.D. 1300. Conversely, the paper traces the social pathways and mnemonic processes involved in the possible cultural transmission of iconography related to the avian solar anthropomorphized deity, diffused from Formative Olmec maize religion to the Old Uto-Aztecan Flower World Complex ca. 1500 B.C. This period of cultural transmission was concurrent with the Early San Pedro-Basketmaker II phase of the Hohokam horizon (ca. 1500–1200 B.C.) along the western coastal Sierra Madre Occidental corridor and into the U.S. Southwest (Matson 1999:10–11; Simms 2008:200).

The mechanisms for the diffusion of maize with religion and iconography into the U.S. Southwest appear to have centered on Formative period interregional exchange, as well as intermarriage and resulting bilingualism between Otomanguean and SUA and Ancestral Hopi individuals living in small groups. During the Early Formative/ Agricultural Period, SUA and Ancestral Hopi speakers integrated and modified Olmec maize ideology and iconography, creating their own religion, the Uto-Aztecan Flower World Complex, which persisted to varying degrees in U.S. Southwestern cultures.

Beginning with Basketmaker III (A.D. 500–750), rock art and material culture represent a secondary elaboration of "Olmec" sun-eagle deity iconography when the crescent moon element was added to the avian solar or "rayed" headdress style. The "Olmec" sun-eagle headdress style underwent replication (*Ahu'l Katsina* feathered circle), followed by modification when the *Hu Katsina* crescent moon "horns" were appended to the rayed-sun motif. When Eastern Puebloan peoples settled on Hopi First Mesa ca. A.D. 1700, the Oraibi *Hu* ("Whipper") *Katsina* headdress style underwent further modification (e.g., Walpi's *Tunwap Katsina*) as the result of horizontal transmission of iconography (bison's upward curving horns), perhaps influenced by the Buffalo Dances from the Eastern Pueblos.

In closing, variations in avian solar deity headdress motif iconography possibly reflect the mental and behavioral processes whereby incipient farmers combined solar and lunar ritual calendars associated with maize agriculture. As Hopi oral tradition attests, *Powamuya,* and by association the *Hu Katsina,* did not originate in their present forms in the South (Central Mexico). Alternatively, created during their migrations in the Southwest, they reflect the behavioral and

iconographic innovation of diverse peoples who would become Hopi (*Hopisinom*) as they adapted to the challenges of maize farming on the northern Colorado Plateau.

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END NOTES

[1] I use quotes around the name "Olmec" to suggest the problematic relationship between western Olmec Otomanguean speakers and Gulf Coast Mixe-Zoquean speakers. The reference to Early Formative "Olmec" maize religion used in this paper denotes a pan-regional Otomanguean religion, emerging at least by 1500 B.C. From this period, incipient agriculturalists of various ethnicities and languages (including Gulf Coast Mixe-Zoquean), associated successful maize production with a maize religion, nature deities, ritual practices and paraphernalia (Marcus 1989:152–153; Taube 2000:297).

[2] The term "anthropomorphized deity" used in this paper refers primarily to animistic nature deities associated with successful crop production (sun, rain, and maize) in both Mesoamerica and the U.S. Southwest. To the extent that these "deities" are implicated in agricultural success, the term captures all Beings who control weather and sources of rain in ground water from mountain caves and springs. Based upon ethnographic analogy, ancestor worship is often integral to agricultural religions in Mesoamerica, as well as in the Old World (Greece, Europe), Africa, and China (Eliade 1958:58–59, 110; Monaghan 1990:563–564).

[3] Steven R. Simms (2008:203, 205) provides DNA and material cultural evidence that Fremont culture resulted from processes of interaction, such as intermarriage, between immigrant Basketmaker maize farming males and indigenous forager women with Archaic roots. Intermarriage as a mechanism for cultural transmission in the Southwest mirrors that in Formative Mesoamerica between Otomanguean-speaking farming males and SUA forager women.

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