

Star Trek: Recovery and Review of the First Alleged Supernova Rock Art

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Abstract

In 1955 Palomar Observatories photographer William C. Miller linked “star” and crescent imagery at two northern Arizona rock art sites with the Crab supernova of A.D. 1054, and his interpretation precipitated a lasting trend of supernova association with other star/crescent pairings in rock art. Miller’s two original panels of alleged supernova rock art had not been reexamined, however, for more than 50 years, until May 2008, when the authors established exact locations for these remote sites and reached them. These visits provided an opportunity to examine and evaluate the panels in context and prompted reconsideration of the supernova explanation for this rock art.

“estrella” y de Media Luna Roja, localizadas en dos sitios de arte de roca en Arizona, con la supernova del Cangrejo de 1054 d.c. y fue su interpretación que precipitó una tendencia duradera de asociación supernova con otros pares de estrella y la Media Luna Roja en el arte rupestre. Dos paneles originales de Miller de supuesta arte rupestre supernova no habían sido reexaminados, sin embargo, por más de 50 años, hasta el mayo de 2008, cuando los autores establecieron la ubicación exacta de estos sitios remotos y llegaron a ellos. Estas visitas ofrecieron la oportunidad de examinar y evaluar los paneles en contexto e iniciaron la reconsideración de la explicación de la supernova de este arte rupestre.

Resumen

En 1955, el fotógrafo William C. Miller del Observatorio Palomar, enlace las imágenes de

Over the last five decades, dozens of star/crescent combinations in rock art, particularly in the American Southwest and California, have been identified as

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Evelyn Billo, BSc in mathematics from New Mexico State University, founded Rupestrian CyberServices (RCS, <http://www.rupestrian.com/>) in Flagstaff, Arizona, after retiring from the United States Geological Survey (USGS) in 1995. She has volunteered as president of the American Rock Art Research Association (ARARA) from 2008 to 2010, as a research associate in anthropology at the Museum of Northern Arizona (MNA), and as vice president of the Northern Chapter of the Arizona Archaeological Society. Along with her husband, Robert Mark, chief scientist at RCS, she won the 1999 ARARA Conservation and Preservation Award and the 2002 Oliver Award for Excellence in Photography.

Robert Mark received his MA degree in physics and his PhD in geology from Stanford University. Retired from the USGS, in 1997 he joined Rupestrian CyberServices, where he specializes in applying digital image enhancement and other computer techniques to recording rock art for archaeologists and site managers. Current projects include precision mapping, photography, recording, and analysis of petroglyphs, geoglyphs, trails, and other archaeological features within the BLM Sears Point Archaeological District. Bob and Evelyn helped curate the “Stories on Stone” exhibit at MNA in 2005–2006 and assisted French prehistorian Jean Clottes with panorama imagery within Chauvet Cave in 2000.

depictions of the Crab supernova, which was observed and recorded by Chinese astronomers in A.D. 1054 (Brandt et al. 1975; Brandt and Williamson 1977, 1979; Eddy 1978; Krupp 1995, 2009). The supernova was conspicuous. For a time, after the Sun and the Moon, it was the brightest object in the sky. According to the Chinese, it was visible in the daytime for 23 days, and it took two years to fade completely from view (Clark and Stephenson 1977; Duyvendak 1942; Needham 1959).

Calculations indicate the Crab supernova would have been visible with the waning crescent Moon in the American Southwest, near the eastern horizon in the morning sky before dawn, on July 5, 1054 (Brandt et al. 1975). A recent astrophysical review, however, ties the appearance of the supernova to the previous spring (Collins et al. 1999), and further analysis indicates the Crab supernova would have accompanied the waning crescent Moon on the morning of April 13, 1054 (Fountain and Abt 2006).

The Birth of “Supernova” Rock Art

The Crab supernova interpretation of star/crescent rock art originated in 1955, with reports and commentary by William C. Miller, photographer for Palomar Observatory, on two sites in northern Arizona. Miller (1955a, 1955b, 1970) identified the sites’ locations as White Mesa and Navaho Canyon.

Miller’s report provided a general description of the two locations, “one in a cave containing ruins located in White Mesa, and the other on a canyon wall closely associated with ruins on a tributary of Navaho Canyon” (1955b:1). The White Mesa image is a red pictograph. Navaho Canyon’s depiction is a petroglyph. In Miller’s publications, both images were closely cropped or drawn, and no additional information on panel placement at each site was given.

According to Miller, both sites “opened to the south and had an unobstructed view of the eastern sky.” He added: “Both sites, particularly that in Navaho Canyon, show evidence of occupation at the time of the supernova” (1955b:7). He also mentioned “inconsistencies,” and by that he probably meant the directionality of the two crescents. The crescent opens to the left at White Mesa and to the right at Navaho Canyon. The real waning crescent Moon opens to the right.

Miller acknowledged the circumstantial character of all of the evidence but expressed the hope that “other examples of similar prehistoric drawings in the southwest” will be discovered (1955b:8).

Although the astronomical community’s recognition of Miller’s work endured, there was no further study of star/crescent imagery until 1975, when astronomer John C. Brandt and his collaborators (1975) discussed the original rock art and also identified three additional examples in the Southwest. Of these, the Peñasco Blanco pictograph panel in Chaco Canyon, New Mexico, subsequently became the poster child for supposed Crab supernova rock art. Soon, Brandt and others (e.g., Brandt and Williamson 1979) added many more star/crescent sites to the list. Examples were identified outside of the Southwest—in California, west Texas, and Baja California, Mexico.

Other explanations for the star/crescent iconography have been suggested (Ellis 1975; Koenig 1979), and it is now evident that some of these rock art sites cannot be representations of the Crab supernova (Armitage et al. 2005; Krupp 2009). Nonetheless, the supernova story resonated with astronomers, and the Crab supernova interpretation of the star/crescent rock art is still broadly accepted in the astronomical community today.

Miller (1955b) included a photograph of the White Mesa rock art and a drawing of the Navaho Canyon rock art in his paper. Neither the illustration nor Miller’s accompanying commentary provides any information on the context of either panel. Subsequent reports of other star/crescent sites were similarly limited. Unfortunately, published pictures of the rock art were closely cropped, and no detailed discussions of setting were offered. For that reason, over 30 years ago, the three of us independently initiated programs to visit, document, and, in Krupp’s case, analyze each of the primary star/crescent sites.

Elusive and Lost

Thirty-three years of inquiry in the astronomical community and in the rock art community failed, however, to pinpoint the location of the White Mesa and Navaho Canyon sites. Krupp found no one who had been to either site or who even knew where they are located. Later publications that mentioned or

discussed these sites relied on Miller's tightly framed photographs. By 2008 it was apparent no one had deliberately revisited Miller's original star/crescent sites since the mid-1950s, when Miller published his account.

Although Miller supplied no detailed location data, he referenced the analysis of material from the sites by Dr. Robert C. Euler, curator of anthropology at the Museum of Northern Arizona in Flagstaff. Miller also acknowledged the help of astronomer Dr. Helmut Abt, who "assisted in the two archaeological surveys during which these two drawings were found" (1955b:8). Essential information—the official archaeological designation of each site—was included in the important review by Brandt et al. (1975). The White Mesa site is NA 5561, and the Navaho Canyon site is NA 5653.

Helmut Abt confirmed that Miller had written detailed reports to the Museum of Northern Arizona and suggested that its records would be the best place to look for definitive information. Abt also recalled that the White Mesa site is located at the upper (eastern) end of a major drainage that goes out the west side in a cave a few hundred meters from the eastern cliffs of White Mesa. Abt, however, had "no idea of the location of the Navaho Canyon site," except that it is "in the upper-half of that long canyon." Both sites, he added, are "on Navaho land and can be visited only with tribal permission" (Abt, personal communication 2008).

After years of fruitless inquiries, Ed Krupp asked Rupestrian CyberServices (Evelyn Billo and Robert Mark), based in Flagstaff, to assist in the search. Encouraged the two sites might be documented in the Museum of Northern Arizona archives, Krupp asked Billo and Mark, who are both research associates in anthropology at the museum, to look for reports on both sites. By late spring 2008 they had found sufficient documentation to confirm exact locations. They established how to access the White Mesa site, and they also organized a reconnaissance expedition to determine whether the Navaho Canyon site could be reached via a relatively short descent from the south rim of Binne Etteni Canyon. Because that route turned out to be impossible, they determined that a hike of 9 km from the north end of Binne Etteni Canyon would be required.

Rupestrian CyberServices already had a tribal permit to conduct rock art research on the Chinle drainage within the Navajo Reservation. In April, Ron Maldonado, Navajo Nation archaeologist, extended the permit to include an examination of rock art sites south of the San Juan River, a zone that includes the areas of the White Mesa and Navaho Canyon sites. Krupp, Billo, and Mark planned an excursion for late May 2008 en route to the 35th Annual Meeting of the American Rock Art Research Association in Farmington, New Mexico.

On the Road to White Mesa

On May 19, 2008, Krupp, Billo, and Mark were joined by Dr. Donald Weaver, Larry Midling, and Ilona Anderson. The group departed from Flagstaff at 7:30 a.m., MST, and continued to the vicinity of White Mesa. Following reservation roads and guided by GPS, the group parked roughly a mile northwest of NA 5561. Navigating with the GPS and following trails, the group reached NA 5561 shortly after noon (Figure 1).

NA 5561 is a very large shelter, or cave, about 30 m high, 30 m wide, and 15 m deep. Reached via sand hills and a talus slope, it is hollowed out of the sheer face of a tall, eroded pinnacle at the west end of White Mesa. About 14 roofless ancient pueblo dwellings survive inside, one near the west side of the wide entrance and the rest about halfway up the shelter, along the back wall. The cave opens south, and a long ridge that runs northeast–southwest on the other side of the fronting drainage provides the primary horizon.

The "supernova" pictograph, a red circle intercepted by a partial crescent that opens to the left (west), is on the back wall, a little above the building line and roughly centered in the cave (Figure 2). In adherence to Arizona Archaeological Society rock art recording standards, the painting normally would be classified as a circle with an appendage. It is large, bright, distinctive, and conspicuous (Figure 3). It looks fresh, especially when compared with more fugitive pictographs detectable nearby on the back wall. Because these pictographs are so faded and in another style, they appear to be much older than the so-called supernova. The contrast is striking, and the star/crescent is almost a singular feature in the cave.



FIGURE 1. NA 5561 is a deep natural shelter at the west end of White Mesa. Remains of more than a dozen prehistoric rooms are preserved in NA 5561. The star/crescent pictograph is centered on the back wall, just above the highest rooms. Photograph by E. C. Krupp.

There is, however, another bright pictograph painted in a similar red pigment on the east side of the shelter at more or less the same height and above a recent structure identified as probably Navajo by archaeologist Donald Weaver. The design resembles a shield or clan symbol (Figure 4). Its similarity, in color and brightness, to the alleged supernova painting suggests they both belong to the same era and are undoubtedly more recent than the eleventh century. The site also contains Navajo carvings and more recent graffiti, an indication of a long history of visitation and use.

Pueblo II, Pueblo III, Pueblo IV, and Hopi ceramics



FIGURE 2. NA 5561's star/crescent pictograph is actually an appendaged circle and is isolated on the wall behind the upper ruins. Photograph by E. C. Krupp.



FIGURE 3. The red paint of the NA 5561 star/crescent pictograph is bright. The "star" is actually a disk or circle, and the crescent is distinctively truncated by the circle. In the certified rock art recording lexicon, it would be designated as an appendaged circle. Photograph by E. C. Krupp.

were found at NA 5561, and some sherds were judged to date as early as A.D. 1070, a little later than the Crab event. The pictograph, however, seems much more recent in style and in preservation. It may, in fact, not be astronomical at all but a Hopi symbol. It is similar to Pueblo IV depictions of a one-horn kachina. If the circle is actually a head and the intersecting partial crescent a horn, then the pictograph qualifies as a very simplified representation of Wupá'ala, the Hopi long-horned kachina who usually appears in the mixed kachina dance and is most frequently encountered on

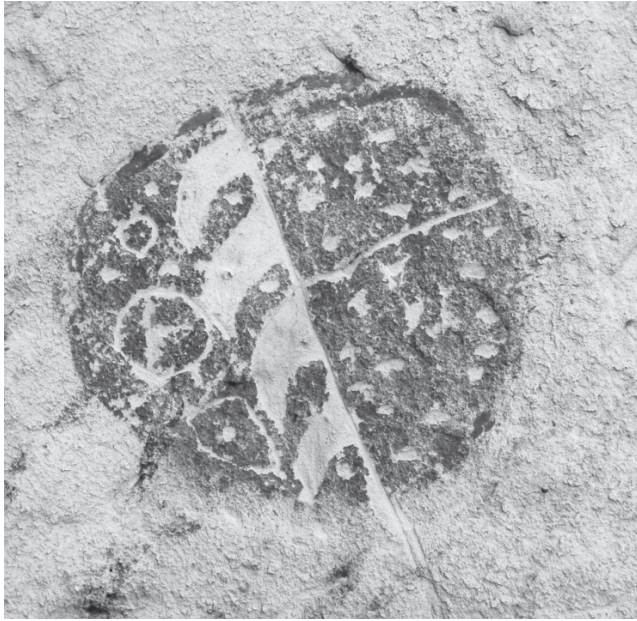


FIGURE 4. Another bright red, shieldlike pictograph on the east side of the shelter wall resembles in color and preservation the star/crescent appendaged circle image. Photograph by E. C. Krupp.

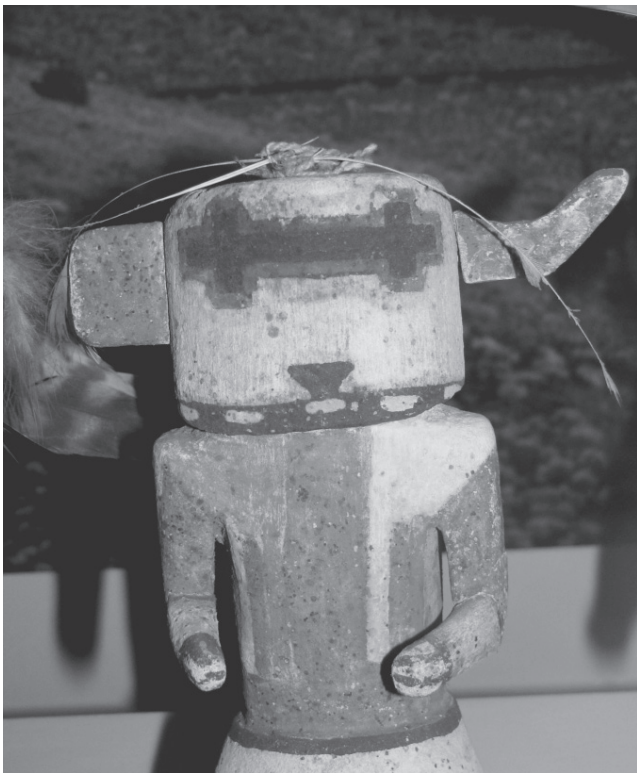


FIGURE 5. Hopi kachinas include Wupá'ala, with his distinctive single horn. Photograph by E. C. Krupp, University of Pennsylvania Museum of Archaeology and Anthropology.



FIGURE 6. Saiyatasha, Zuni's one-horn kachina, is the rain priest of the North. He plays an important role at the Shalako ceremony in early December and here leads the Hututu rain priest and Yamukakto warriors (from Stevenson 1904).

First Mesa (Wright 1973:116) (Figure 5).

Wupá'ala is patterned after Sai-astasana (also Saiyatasha, Saiyataca, and Caiastacana) (Wright 1973:116), a Zuni kachina regarded as the rain priest of the north (Fergusson 1931:92; Wright 1985:33–34). He observes the Moon. He controls the calendar and tells when planting should begin, when ceremonies are to be held, and whether ceremonies are to be postponed (Figure 6). He appears only during Shalako, and his name means “long horn.”

Alternatively, the pictograph could represent a head with a scalping knife. Schaafsma (2007) has identified this iconography in southern Tewa rock art.

On the Navaho Canyon Trail

Departing White Mesa in midafternoon, we continued east on State Route 98 and then took a jeep track north toward Navajo Creek and to the west rim of the north end of Binne Etteni Canyon, where we camped overnight.

The next morning, at 6:00 a.m., we descended into the canyon and followed the jeep track on foot. We then took a trail through the drainage upstream to the south for about 9 km over both level and very uneven terrain, broken frequently by steep and deep arroyos. With the GPS, we located NA 5653, Miller's Navaho Canyon site, at 11:20 a.m. in a side canyon to the east. The site was obviously misnamed, for the primary canyon is Binne Etteni Canyon, through



FIGURE 7. NA 5653 is a ruin in a side canyon off Navajo Creek. A rich variety of petroglyphs and pictographs on the cliff face to the left accompany the remains of buildings. The view of this photograph is to the east. Photograph by E. C. Krupp.

which Navajo Creek runs (Figure 7).

NA 5653 includes a number of structures built against a very high vertical cliff on the north side of the tributary. The rock art on the cliff face is extensive, and it continues for about 45 m. It is mostly petroglyphs in a variety of very different styles and techniques of manufacture. Red, white, yellow, and black pictographs are also present.

Archaeological analysis of pottery sherds and stratigraphy indicate the site was occupied between A.D. 700 and 1300 (Miller 1955b).

Despite repeated scrutiny by several members of the group, the “supernova” disk/crescent petroglyph that seemed so conspicuous in Miller’s photograph was not spotted on the wall, which was lit by direct Sun, until Billo found it in the midst of an eye-level

panel with many other elements (Figure 8).

This so-called supernova is neither obvious nor distinctive. It actually is a combination of three elements—a well-defined crescent, a disk, and an unidentifiable figure appended to the disk. The appended disk is truncated in Miller’s published photograph, which shows only the disk and not the attached figure. These petroglyphs are on a cliff face possessing several other petroglyph elements executed in a similar technique (Figure 9).

Miller’s tight framing of a chalked image omits essential information. The unidentifiable appendage just below the disk appears to be in contact with the disk and creates a petroglyph that subverts the apparent singularity of a supernova depiction. There are also animal, bird, and geometric petroglyphs, including a double circle, nearby (Figure 10).

This side canyon is narrow, and its walls are very high. The view to the east is obstructed by both flanks of the canyon. It is unlikely the July 5, 1054, configuration of the Crab supernova with the waning crescent Moon would have been seen from NA 5653 or from anywhere near it. That does not mean an eyewitness observation could not have been engraved from memory upon the rock, but it is hard to reconcile the depiction of an extremely unusual, unexpected, and eye-catching astronomical event with a relatively small component of a complex panel.

While it is possible to interpret the circle in the White Mesa pictograph and the disk in the NA 5653 petroglyphs as a star in the company of the crescent Moon, each rock art panel has idiosyncrasies that invite alternate interpretation and undermine definitive identification.

The condition of the White Mesa pictograph and the occultation of its crescent by its circle suggest that this painting, like the nearby symbol it resembles in color and preservation, is too recent to be a drawing of the A.D. 1054 supernova. Although inadvertent reversals in drawings of the crescent Moon have been rationalized, such freedom of orientation adds ambiguity to any detailed interpretation. In any case, the crescent in this painting incorrectly opens to the left, opposite to the direction an accurate illustration of the Crab supernova would have.

The Navaho Canyon petroglyph at NA 5653 may

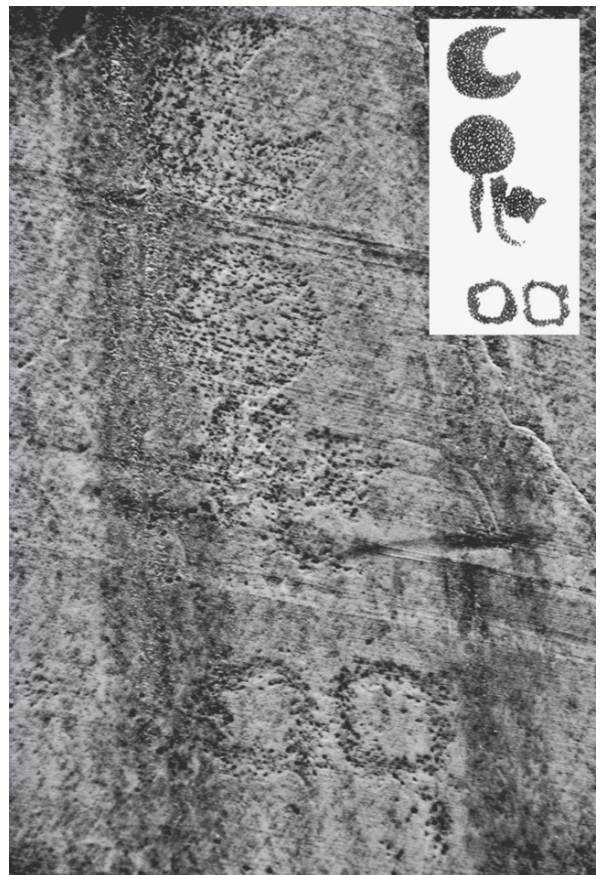


FIGURE 8. Miller's star/crescent at NA 5653 is accompanied by other petroglyphs on a darker section of the cliff face to the east of a small ruin. The crescent and "star" are nearly lost in midday light. Miller's close-up photograph has much higher contrast, chalked elements, and even closer cropping. Photograph by E. C. Krupp.



FIGURE 9. The star/crescent panel at NA 5653 is only part of an area of sheet wash that has many other petroglyphs nearby. Photograph by E. C. Krupp; image enhancement by Robert Mark.

FIGURE 10. Digital processing enhances the contrast and reveals detail in the NA 5653 panel that includes the crescent and shows that an area pecked in the same style as the disk and with the same patination as the disk is actually attached to the disk. Other images, including a pair of circles, add further ambiguity to the meaning of the panel. Photograph and image enhancement by Robert Mark; illustration of petroglyph (insert) by Margaret Berrier.



correspond to the correct time period, but it is not clear why a singular astronomical event would be depicted with other apparently unrelated petroglyphs. The pecked figure directly below and connected to the disk is especially difficult to explain. Because it is attached to the disk, it compromises a stellar interpretation, despite what is apparently a crescent Moon above the disk.

Conclusions

These two sites, NA 5561 and NA 5653, established an interpretive preference in North American rock art studies that equates star/crescent combinations with eyewitness observations of the Crab supernova near the waning crescent Moon before dawn on July 5, 1054. The Crab supernova interpretation of some of the other star/crescent rock art is dubious, however, and for that reason, the two original sites deserved a rigorous review that would reveal their actual context. That exercise could be performed only through on-site inspection, and such an examination had not been undertaken in over 50 years. Now that the sites have been relocated and reexamined, features that appear to be at odds with the supernova interpretation strongly suggest that the supernova interpretation of other rock art sites can only be considered after a careful study of the sites and their local and regional context.

Acknowledgments

We are grateful to Navajo Nation archaeologist Ron Maldonado and the Navajo Nation for permission to visit and examine NA 5561 and NA 5653 and to publish this report. We are grateful to the Museum of Northern Arizona for its vigorous preservation of valuable research records and for providing access to them. We also salute Margaret Berrier, who brought the invisible into view with her drawing of all of the elements of the NA 5653 Navaho Canyon star/crescent petroglyph.

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