Chronology, context, and select rock art sites in central Baja California

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Abstract

Dating rock art in central Baja California is of high interest to archaeologists but continues to be problematic in many instances. Furthermore, incorporating the images into their broader archaeological context is a worthwhile goal worldwide in attempting to understand the lifeways of prehistoric peoples. This paper discusses some of the exploratory work undertaken toward (1) dating select central peninsula rock art sites, and (2) comprehending the place of the motif complexes in the broader archaeological record.

Introduction

Directly stated or implied, various archaeologists in Baja California have been searching for the age, origins, and meaning of regional pictographs and petroglyphs for over a century. The primary focus has been on the elaborate Great Mural art of the central peninsula (Figure 1). But there have been a number of studies aimed at other rock art styles and localities in both Baja California Sur and Baja California. This paper will present some of the exploratory studies directed at dating select central peninsula Northern Abstract and other style rock art sites (see Figure 2) and will examine some of the efforts toward comprehending this rock art's place in the broader archaeological record.

Theoretical approach

Our approach to the study of rock art, its age, and its function can be labeled rationalistic, an overall multifaceted, synergistic, or pluralistic approach (cf. Ritter 1993, 2002; Whitley 2000:142-145). Nissen and Ritter (1986), Morwood (2002), Gilreath and Hildebrandt (2001), and Olsen (2005) are among many rock art researchers who have espoused the multilineal method of rock art inquiry (also see Conkey 2001:295-296). Of course, single facets of the rock art can be studied as contributing aspects of the broader approach. Here we include other archaeological and environmental evidence; an analysis of the rock art itself in terms of various physical, positional, and stylistic characteristics; a study of the chronology, cultural, and physical landscape interrelationships; ethnographic and ethnohistoric considerations; and a look at recent art systems. Olsen (2005:149) goes so far as to state that rock images are part of the symbolic communication system that interacts with language and other cultural systems to accomplish culturally perceived goals. The aim in this paper is to reveal some of the methods that can assist in placing the art in time and determining associations of culture(s).

Figure 1. Great Mural art, La Palma, Sierra de San Francisco. (Large figures are approximately life-size.) (Photo by Eric Ritter, 1988.)

Dating methodology

It has been stated that "assigning an age to much rock art is difficult, yet dating is so fundamental to archaeological knowledge that undated things are largely left out of archaeological study" (Loendorf et al. 2005:5). It is recognized that, generally speaking, the use-life of rock art extends beyond its actual production, possibly even into the present. "Establishing the point in time at which rock art enters into, or begins to shape, the cultural landscape, allows for clarifying the possible sequence of use and articulation with associated behaviors" (Ritter et al. 2007:127). Dating rock art can take a number of avenues, not all mutually exclusive. These paths can be absolute and relative, singularly or together. Ward and Tuniz (2000:17) have rightly stressed that dating rock art only provides reliable results with the interaction "among archaeologists, geochemists, environmental scientists, archaeo-chronologists, and indigenous custodians (vis-à-vis Australia) in all phases of the research."

Keyser (2001:118) notes that there are eight major sorts of evidence for relative dating. These categories are (slightly modified herein): (1) association with dated archaeological deposits

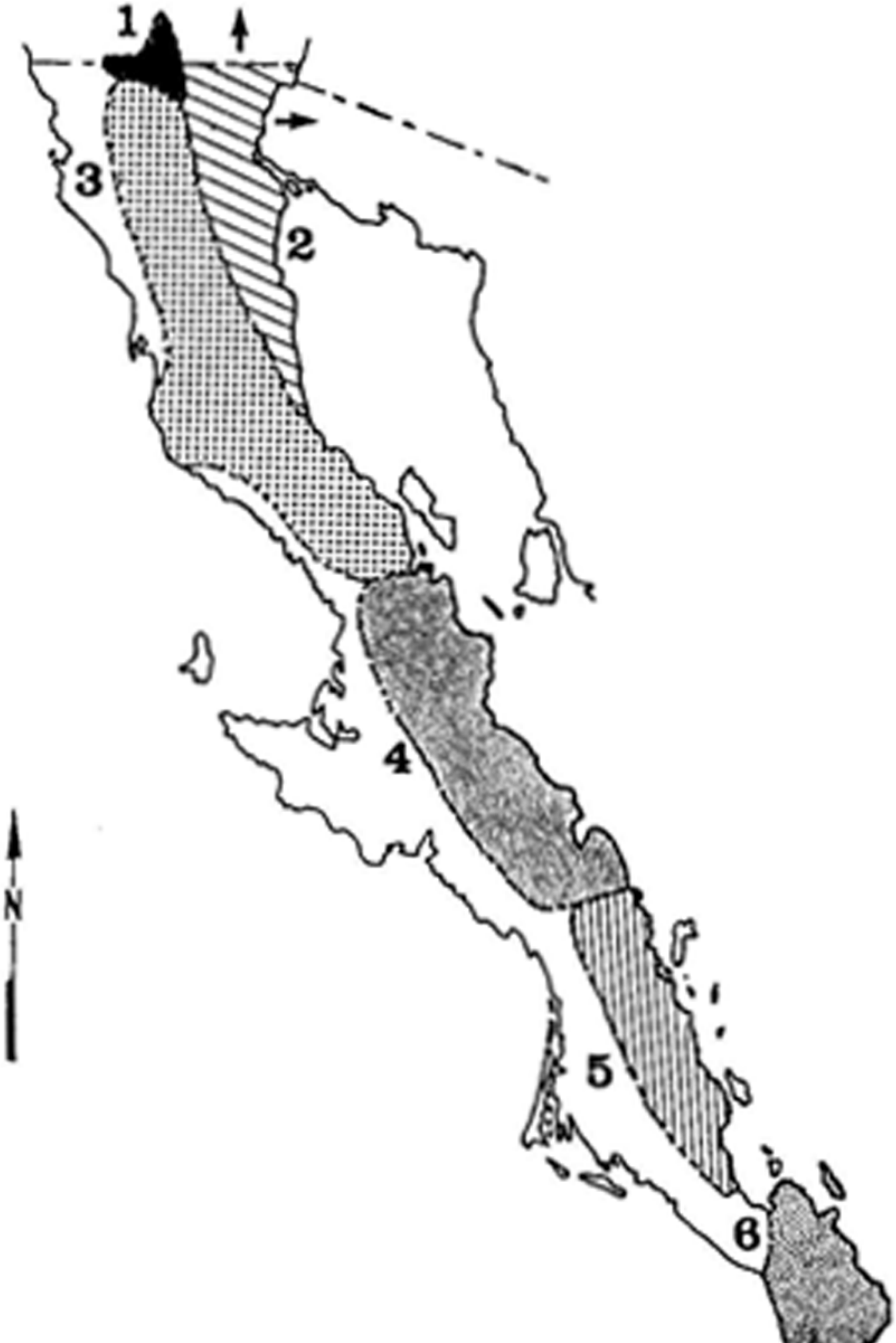

Figure 2. Major Baja California rock art zones. (1. La Rumorosa; 2. Western Archaic; 3. Northern Abstract; 4. Great Mural; 5. Sierra Giganta; 6. Cape.)

or remains; (2) connection with dated portable art; (3) displays of datable subjects such as projectile point types, atlatls, or extinct animals; (4) superimposition and horizontal distribution and seriation of motifs; (5) rock coatings, mineral weathering, and microerosion (cf. Bednarik 2002, 2010), including lichenometry; (6) access to images as controlled by past datable geologic and hydrologic events and processes; (7) ethnographic information; and (8) materials used in the production of the art. Bednarik (2010:217) has also mentioned the development of digitized colorimetry to achieve seriation dating of ferromanganese patinas.

Baja California is at or near the forefront in North America when it comes to “absolute” dating of rock art, in this case chronological studies of the Great Mural pictographs. However, such dating is still experimental and not without its own set of problems.

Rowe (2001) has offered a summary of dating studies of prehistoric pictographs in North America (including Baja California), especially the use of accelerator mass spectrometry (AMS) dating of pictographs. While this technique is promising, problems remain in sampling, natural mineral accretion layers on the surface of the image containing calcium carbonate and calcium oxalate, multiple pigment layers, carbon-containing bedrock, older oxalates in plant binders (cf. Franceschi and Nakata 2005), and additional accretion layers. Furthermore, Steelman and Rowe (2005) have discussed using independent dating of pictographs and using several laboratories in the analyses since there are special problems in pictograph dating. Among the independent tests they discuss there is the use of thermoluminescence and electron spin resonance dating for a calcite layer covering pictographs dated through AMS by plasmachemical extraction at a site in Brazil. In this respect the various “absolute” dates obtained on pictographs in Baja California to date, summarized below, must remain provisional.

Dorn (2001) lists some of the “absolute” techniques used in dating petroglyphs, including radiocarbon dating of carbonates, oxalates, charcoal, intra-coating detritus and sealed weathering rind organics found in the image, and cation-ratio dating of rock varnish in petroglyphs images. Lytle et al. (2008) and Rogers (2010) have discussed the X-ray diffraction method for dating manganese buildup in varnish accumulations in petroglyph images. Dorn (2001:169-170) would perhaps add the study of cosmogenic nuclides, thermoluminescence, and rock varnish microlaminations related to rock art panels (or geoglyphs), and age estimates derived therein to this list. Merrell and Dorn (2009:210) discuss leadprofile dating and electronic dispersive spectroscopy as applied to petroglyphs in Idaho. These various categories can present problems of their own in terms of reliability, topics beyond this paper’s reach. Bednarik (2002) has discussed some of the limitations of varnish and other rock art dating techniques.

Previous peninsula dating studies

As background to our primary focus on four central peninsula sites that can be found at the nexus of the Sierra San Borja to the south and the Valle de los Cirios to the north (La Angostura, Las Tinajitas, Montevideo, and Cueva Abraham) (Figure 3), it is sensible to review other archaeological studies that moved beyond just an analysis of the images themselves where researchers made efforts to find both a means to date the images and to some degree or another understand the cultural/environmental context of these sites.

Rincon de San Antonio

The earliest evidence of rock art site excavation has to be the 1883 informal digging by

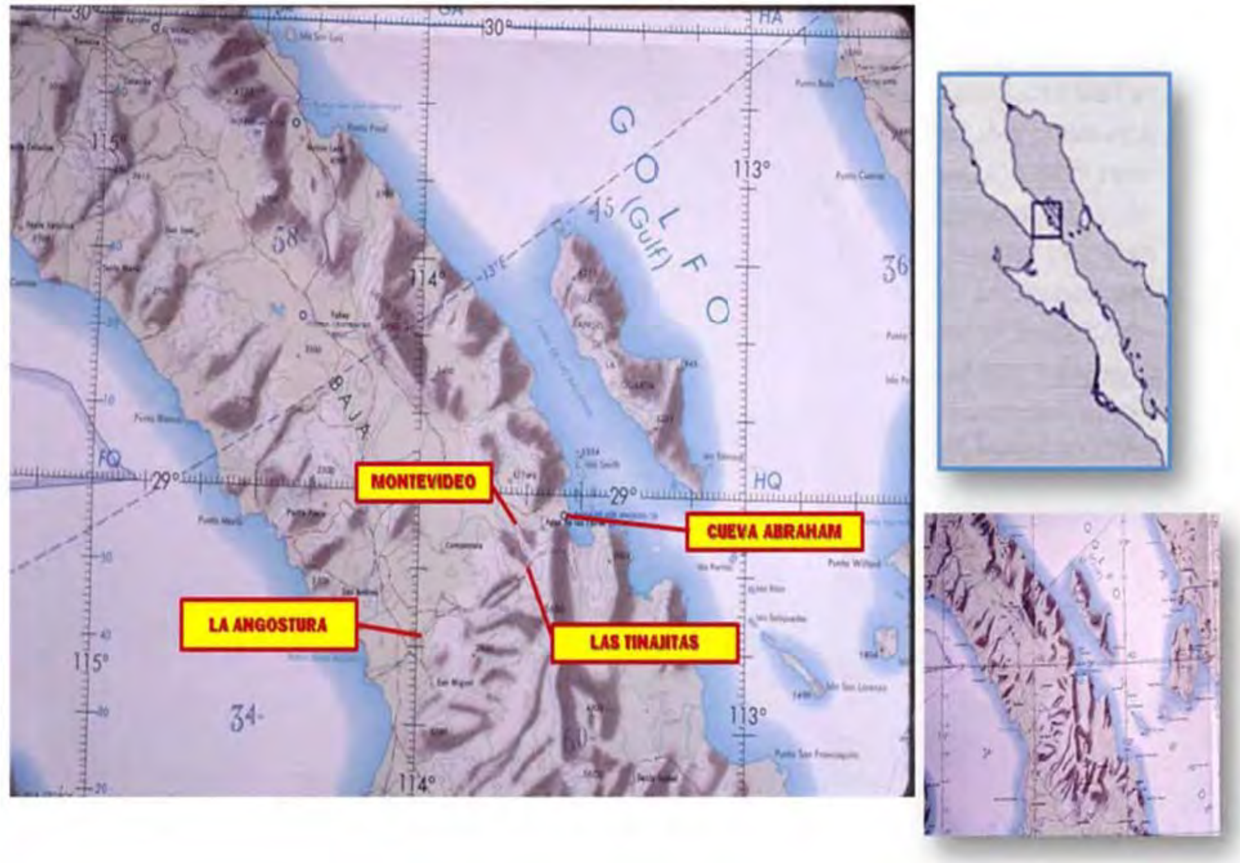

Figure 3. Study focus sites.

anthropologist ten Kate (van der Pas 1977) at the pictograph site of Rincon de San Antonio in the Cape region. This painted site with largely geometric and obscure figures revealed the presence of “a few human bones, ribs and phalanges painted red” under and next to the largest of the rocks with paintings (van der Pas 1977:72). This possible temporal association would suggest the presence of late prehistoric Las Palmas culture remains. In fact, Fujita (2006:98) associates Cape painted sites with Las Palmas peoples.

Cueva San Borjitas (BS-D102) and Cueva de los Venados (BS-D100)

Innovative Baja California (Mexican) pioneer researchers Barbro Dahlgren and Javier Romero were the first to conduct systematic excavations in the peninsula at archaeological sites with rock art present (Dahlgren and Romero 1951) (Figure 4). Two adjoining rockshelters in the Sierra de Guadalupe with pictographs and petroglyphs were tested for determining their function, age, and cultural association. While the authors were intrigued by correlations with Texas rock art, they were reluctant to offer an opinion about their age and any ideas about the authors of the painting, noting possible clan and warfare associations. It is interesting that one shelter (Cueva Venado) yielded human bone and a wooden dart, and the main shelter (Cueva San Borjitas) yielded projectile points that appear to be Elko and Gypsum Cavelike (also see Ritter 1979), placing the deposit in the range of 1,500 to 3,000 or more years ago. Dahlgren and Romero were not versed in the local typology or age equivalents at the time of their work. Furthermore, as discussed more

Figure 4. Cueva San Borjitas. (Photos by Dale Ritter, 1969.)

below, equating cultural deposits and ages or temporally diagnostic artifacts with the makers of the rock images is often equivocal. Moreover, there have been more recent attempts at dating the Cueva San Borjitas pigments, as discussed by Watchman et al. (2002) and Roach (2003), with ages far exceeding those listed above.

Cueva de los Dos Pescadores (BS-D52)

As part of a major research effort in the peninsula's south-central Bahía de la Concepción region by the senior author in 1971, test excavations were conducted at a small rockshelter (BS-D52, Cueva de los Dos Pescadores) with diminutive Great Mural-style pictographs of two adjoining anthropomorphs (Figure 5). The location sits 1 km or so inland along Arroyo del Tordillo. While not explicitly stated (Ritter 1979:97, 103), one of the primary reasons for excavating the apparent midden beneath the painting was to determine potential associations between the people who made and used the rock art and those who occupied or visited the shelter, and possible chronological associations between archaeological remains within the deposit and the pictographs.

The floor of the shelter contained an ashy-appearing midden and a milling slab. The shelter

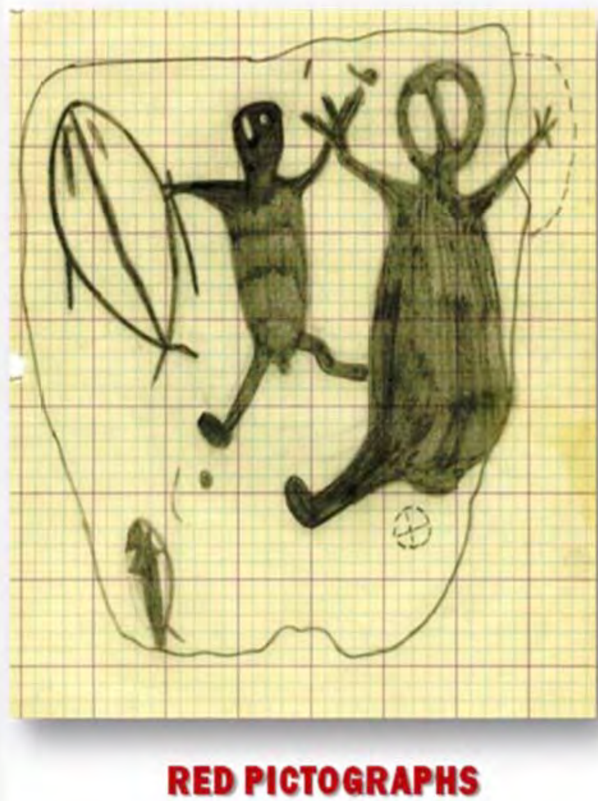

Figure 5. Cueva de los Dos Pescadores. (Photo by Eric Ritter, 1971.)

is about 11 m long and 3 m wide. Three randomly selected 1-x-1-m units were excavated. The deposit is 20-50 cm deep, containing scattered marine shellfish remains; a block metate; strewn charcoal, sticks, and leaves; and a few basalt flakes. No definitive chronological markers are present, and the shelter is presumed to have served as a temporary residential location of unknown prehistoric age. No clear-cut associations between the wall images and the cultural deposit are possible. Nearby (within hundreds of meters) residential and burial rock shelter Cueva Lupe Díaz (BS-D55) contained no rock art (with suitable walls) and has an uncorrected radiocarbon date from an archaeological feature of 670 ±80 years B.P. (GaK-4363) (Ritter 1979:125).

Meighan's seven central peninsula rock art sites

Clement Meighan (1978:11) brought together studies of seven widely dispersed rock art sites (mostly petroglyphs) into a published volume. He suggests that, through obsidian hydration, projectile point association, seriation, and horizontal variation at one site, these sites represent three time periods: (1) Early period, prior to A.D. 1000, predominantly geometric/abstract; (2)

Figure 6. Cueva Coyote. (Photo by Eric Ritter, 1971.)

Later period, A.D. 1000-1500, including many naturalistic motifs labeled Great Mural today; and (3) Historic, after A.D. 1700, primarily related to the mission period. More recent work suggests modifications to this chronology are in order, especially with regard to the first two periods.

Cueva Coyote (BS-D9)

Ritter et al. (1982:53) dated a *Pecten* sp. shell from the surface of a painted rockshelter along Bahía de la Concepción in south-central Gulf-side Baja California (Figure 6). Images in the shelter are the local coastal variants of the Great Mural style (cf. Williams 1983). The uncorrected date obtained is 1690 ±80 years B.P. (UCR-1087).

Sierra de San Francisco/Sierra Guadalupe rock art dating

The Sierra de San Francisco and adjoining Sierra de Guadalupe ranges form the core of the Great Mural rock art style and have been the focus of more rock art research and direct and indirect dating than any other region of the peninsula (Figure 1). Meighan (1966) reported on the first radiocarbon date for a Great Mural site, dating a wooden peg from Cueva Pintada at 530 ±80 years B.P. Rowe (2005:261-262) has summarized much of the AMS dating of Great Mural pictographs in these central peninsula ranges and notes that there are various problems, including the need for more details on the sampling and dating processes. Magar and Davila (2004), based on a detailed analysis of the sequence of painting and dates from one of the shelters (Cueva del Ratón), also question some of the AMS dating, noting that a full understanding of the painted layers in terms of cultural and natural coatings is warranted.

To briefly recap, Fullola et al. (1993, 1994) obtained four radiocarbon dates on pigment that range between 295 ±115 years B.P. and 5290 ±80 years B.P. from Cueva del Ratón in the Sierra de San Francisco. Gutiérrez and Hyland (1997) and Gutiérrez (2008) report two calibrated dates, one each from Cueva San Gregorio II and Cueva de la Palma (Figure 1) of the same mountain range, of 1410-1030 B.C. and 1690-1410 B.C. respectively. Watchman et al. (2002) and Roach (2003) report on a series of dates from sites in the Sierra de Guadalupe, including Cueva San Borjitas, with ages ranging from late prehistoric back circa 7,500 years ago.

Hyland (1997, 2006) has conducted the most extensive excavations and dating of Sierra de San Francisco painted shelters. He obtained 81 radiocarbon dates that range from the Pleistocene-Holocene boundary to the historic period. These dates were on surface and subsurface cultural materials, including charcoal, wood, cordage, and bone samples. Overall, Hyland (2006:127) proposes a post-400 B.C. time frame for the beginning of mural production. Taken as a whole, what has been suggested is that there may be a long sequence of Great Mural rock art in the central peninsula.

Excavation of painted and non-painted sites in the Sierra de San Francisco has also included the work of Fullola et al. (1990) and Castillo et al. (1994). They report on excavations at La Cueva, a shelter without rock art but in close proximity to Great Mural locations, and Cueva del Ratón, a shelter with art. Here in the first location were found a Comondú-period flaked stone industry, ochre, some metates, scattered non-human bones, and floral and shellfish remains suggesting family residential activities. In the second case, excavations encountered burnt features with radiocarbon dates given as 320 ±120, 450 ±60 and 700 ±130 years B.P. This shelter also appears to have served in part as a residential place. The senior author noted a Comondú-period (late prehistoric) serrated point on the surface of the shelter, in line with late prehistory dates.

Gutiérrez (2003) has not only recorded 543 sites with rock art in the Sierra de Guadalupe but has also initiated excavations of this range's sites to find possible correlations between archaeological remains and the artists. One site, Cueva del Guano in the Arroyo de San Sebastián, proved to be a funerary location. More results of her work should be forthcoming.

Rock art site excavations north of the Great Mural area

El Vallecito/La Rumorosa

As part of rock art dating and association/context efforts in the peninsula's north beyond the main Great Mural style area, work has been generally more recent and of a more modest scale. Oviedo García (2005, 2008) has reported on excavations around a series of rock shelters with pictographs at El Vallecito/La Rumorosa. The late prehistoric remains reflect intensive domestic/residential activities and human cremations, more common near painted rock shelters than those not containing pictographs.

Figure 7. Cueva Abraham. (Photo by Eric Ritter, 1995.)

Cueva Abraham

A set of four closely aligned rock shelters on Cerro El Almacén adjoining the Gulf Coast at Bahía de los Ángeles include a non-occupation shelter with hidden red geometric pictographs (Figures 3 and 7). Excavations at an adjoining rock shelter midden with habitation debris yielded a corrected radiocarbon date of 450 ±40 years B.P. Two obsidian hydration readings on Ángel de la Guarda obsidian (2.3 and 4.6 microns) suggest a range of site use of 400 to 1,000 years ago. The overall hill, including rock alignments and burial locations, has been interpreted as a cosmological marker and a place of both domestic and ritual activities, possibly coeval in whole or in part (see Ritter 2009a).

La Angostura

Standard archaeological excavations of two small rock shelters immediately below the petroglyphs and pictographs of La Angostura in the central peninsula have been discussed by Ritter (2009b) (Figure 3). Materials recovered include shellfish remains; flaked stone, including a late prehistoric Manuela contracting stem projectile point; milling tools, including an ochre stained metate; faunal remains (terrestrial and marine animals); shell beads and an ornament fragment; and fire-affected rock. Obsidian hydration readings on flakes of Ángel de la Guarda obsidian are 3.88 and 3.84 microns, similar to the result from Cueva Abraham but older than the reading from Montevideo. A single radiocarbon date on charcoal from a hearth in one unit is cal BP 3000 to 2840 (95 percent probability). The one projectile point suggests more recent activities. And overall the use of the shelters once again appears to be primarily, but perhaps not exclusively, domestic or residential, with interactions at some level with both coasts.


Figure 8. Montevideo site. (Photo by Eric Ritter, 1995.)

Montevideo

In 1995 the senior author placed a small 0.5-x-0.5-m test unit within the ashy floor deposit of a pictograph rock shelter at the Montevideo site in the central interior of the peninsula (Figures 3, 8, and 9). The deposit proved shallow but contained flaked stone of numerous material types (core and biface reduction characteristics), a milling slab, a partial obsidian biface, marine shellfish remains, and some charcoal and seeds (Ritter 1997). A 1.1-micron reading on an obsidian flake from the Ángel de la Guarda source suggests the deposit is late prehistoric. Its affiliation with the paintings is unclear, but obviously day-to-day mundane activities are present, and there is no suggestion of ritual activities in the limited sample of deposit. Further work discussed below provides an additional suggestion of site chronology.

A fresh approach to dating by association

Three of us (Gordon with the assistance of Heath and Heath) have employed an innovative approach to both the dating and an understanding of the archaeological context of rock art sites. This panel-side micro-excavation approach was applied to two central Baja California sites: Montevideo and Las Tinajitas, located not far from Mission San Borja Adac (Figures 3 and 10). Gordon's technique has since been employed on over a dozen pictographs in a half dozen regions of Washington State and British Columbia.

Rupestrian art on near vertical or ceiling faces like at these two sites can include deposits beneath the figures where sediments can include fallen pigment dust or chalk, droplets from the

Figure 9. Test unit at Montevideo (Dr. Justin Hyland). (Photo by Eric Ritter, 1995.)

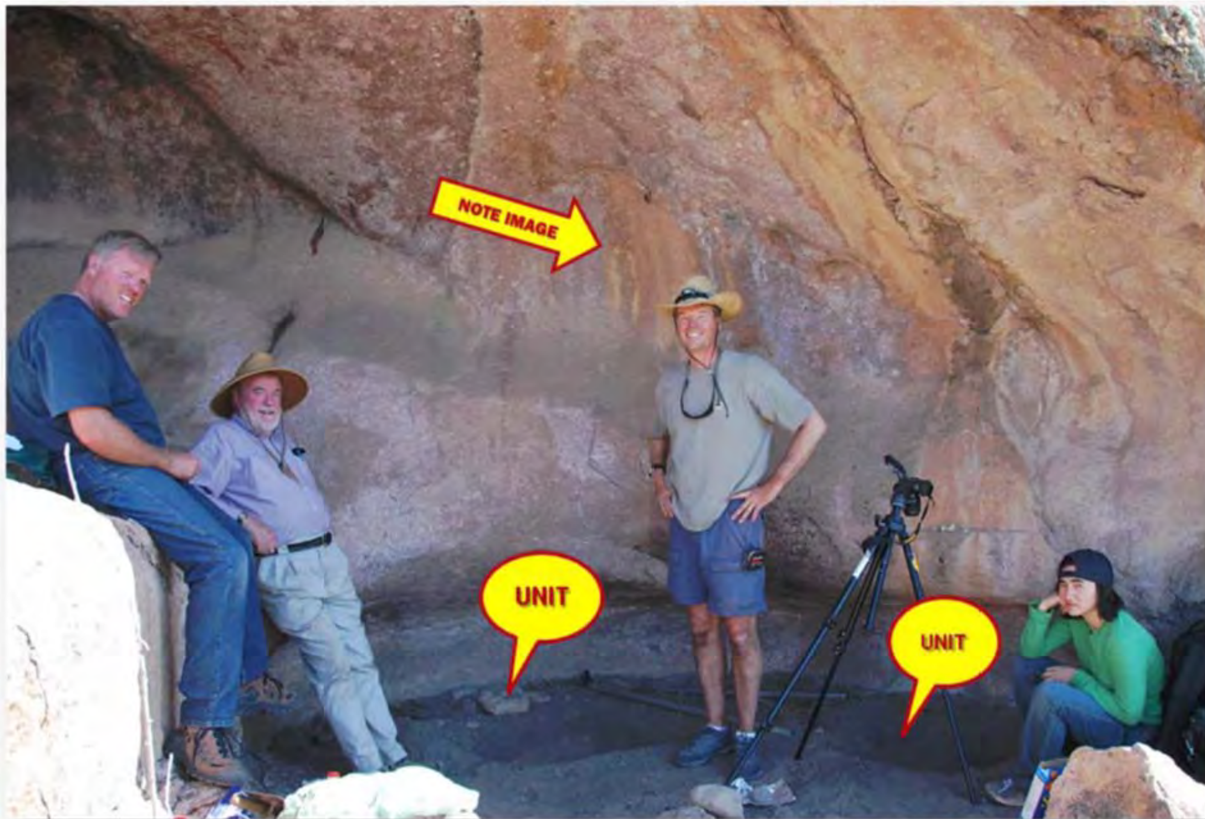

Figure 10. Las Tinajitas lower tested rock shelter (Dr. Bryan Gordon and crew). (Photo by Jenaro Manteon, 2008.)

painting episode itself, or painted or pecked rock fragments that can be associated with AMS-datable charcoal, plant, shell, and bone fragments. The method applied involves the excavation of a 20-x-50-cm rectangular soil scraping or peel in 5 mm increments below the selected rock art panel. Certainly we are not the first to look for associated rock art spalls or materials with splattered or fallen pigment (cf. Loendorf 1994:97-98; Prous 1991; Roosevelt et al. 1996; Wilson et al. 2001:30, as examples). But the technique of specialized photography of micro-levels beneath art, looking for matched fallen rock art fragments and remains of pigment identified not so much by color due to various exposure and chemical processes, but by using physicochemical evaluations for a match is a new wrinkle (see http://http-server.carleton.ca/~bgordon/ Rock Art/rockart_dating_intro1.htm for reference and specifics). Particles are identified with a scanning electron microscope (SEM) and can be compared with the art. A similar application is being developed for petroglyphs, where hammer stone fragments are detected instead of pigments. The underlying soils are scraped in a similar method as with the pictographs. The scraped soils are then sieved for the hammer stone fragments which are then identified by eye or lens to have sharp edges from percussion, and are of different hardness and material than the art. Co-occurring with these fragments is a fine rock flour formed from the bashed parent material. Such an approach has promise at Baja California petroglyph sites.

The initial work at Las Tinajitas first involved the following experimentation in the lab prior to fieldwork (see http://http-server.carleton.ca/~bgordon/RockArt/FieldResults/Tinajitas/ Tinajitas3.htm). To begin with, a piece of plywood leaning over a sandbox had yellow and red ochre designs applied. Electronically, the non-pigment color was removed with Photoshop's inverse function. Freeware Paint.Net or GIMP can do the same using different commands, but all can automatically separate red, green, and blue (RGB) values. One must be precise, because of the similarities of ochre and ferromagnesian compounds in color. Next, a pigment-coated neutral gray paper strip was placed directly on the peel as an RGB standard. The dust from each successive pictograph fell on various colors of newly sprinkled 5-mm-thick sand to a depth of 50 mm. Tilting the camera vertically and photographing each new surface for later evaluation, each 5-mm peel was scraped away with a vertically held rectangular trowel. In this way enough pigment particles were found to confirm the efficacy of the method.

At Las Tinajitas the following steps were undertaken at a selected panel at a lower and upper shelter with horizontal sediments below (Figure 10):

1. Select an ideal panel, followed by photography of the location.
2. With a tripod, digitally photograph the panel to obtain exact RGB values.
3. Drop a pebble from the middle of the art to the soil below to determine the droplet fall line.
4. Outline a 20-x-50-cm slot or unit parallel to the wall around the pebble.
5. Swing the camera 90 degrees to photograph the surface of each 5-mm scraping.
6. Standardize lighting using a flash, with an umbrella to block sun and shadows.
7. Scrape and photograph the surface of each peel to bedrock or sterile soil/sediments.
8. Screen and bag each scraping for charcoal or bone fragments, or other organic materials.
9. Analyze each peel photo for pigment particles (initially in lab in this case, but in future approaches on a laptop computer in the field).
10. Use surface photographs of the pictographs to clarify and add to their definition, including using D-stretch.

(Several years ago it was mentioned to Gordon at the Society for American Archaeology's Atlanta meeting that it would be better to link particles to the art through scanning electron microscope (SEM) identification. To do this and after our Baja California fieldwork, he applied glue-covered simple copy paper to the surface of each level, collecting ca. 1 mm of sand/soil. Using a stereomicroscope, he not only plotted pigment locations better than a camera and computer, but wetted the water-soluble glue to send the pigments for SEM evaluation.)

As it turned out, the lower shelter was better suited for the technique due to its size and configuration. At the upper, cramped shelter, the pictograph was clear but with shallow sediments. Only one peel at 30 mm included charcoal and red ochre residue. The lower shelter had charcoal throughout most of the peels, but ochre-colored particles were not found (see Table 1). We did not run any AMS dates from the samples obtained from this site, but the stage was set for dating the previously tested Montevideo site nearby, where in the renewed excavation with the improved method we found extensive pigment and carbonaceous material.

At Montevideo, a process was followed paralleling the steps outlined above. An excavation unit was selected in a rock shelter immediately below one of the more visible and complex panels, one with a red-and-yellow zigzag or lightning bolt-like pattern. Excavation peels at 5 mm intervals proceeded to a depth of 600 mm.

As can be seen in the adjoining table, there was charcoal present in the dry deposit, beginning at 33 mm and continuing to 600 mm. These charcoal pieces were less than 7 mm across. The first culturally derived stone flake was observed at 66 mm, and the last flaked stone item (core fragment) occurred at 468 mm. Other items observed include marine shell fragments (not fossil), an ochre nodule (156 mm), presumed rodent bones, and a piece of coral. Bioturbation is evident, with one krotovina at 163 mm and small root penetration to the base of excavations. Pebbles and

Table 1. Red particle coordinates for Montevideo pictograph site.

Peel	Image #	Depth (mm)	Findings, Coordinates, Date
1	DSC004	15-20	twigs; pebbles; large rock; leaves
2	DSC005	22	twigs; pebbles; large rock; leaves
3	DSC006	24	twigs; pebbles; large rock; leaves
4	DSC007	26	twigs; pebbles; leaves; charcoal
5	DSC008	29	2 plant needles; twigs; pebbles; leaves
6	DSC009	31	twigs; pebbles; leaves; worm (?)
7	DSC0010	33	twigs; pebbles; large rock; leaves; charcoal
8	DSC0011	35	bone (discarded); twigs; pebbles; leaves
9	DSC0012	38	bone frag.; twigs; pebbles; leaves
10	DSC0013	40	twigs; pebbles; large rock; leaves; charcoal
11	DSC0014	42	twigs; pebbles; leaves; charcoal
12	DSC0015	44	twigs; pebbles; leaves; possible ochre @ X = 17 cm; Y = 30.13
13	DSC0016	47	plant needle; twigs; pebbles; leaves
14	DSC0017	49	twigs; pebbles; leaves; worm (?)
15	DSC0018	51	twigs; pebbles; leaves
16	DSC0019	53	twigs; pebbles; rocks
17	DSC0020	56	twigs; pebbles; charcoal
18	DSC0021	58	twigs; pebbles; charcoal
19	DSC0022	60	twigs; pebbles; rocks
20	DSC0023	63	twigs; pebbles; leaves
21	DSC0024	66	quartzite chip; twig; pebbles; charcoal
22	DSC0025	69	twigs; pebbles; leaves
23	DSC0026	71	pebbles; leaves; wood chunk (handled)
24	DSC0027	74	3 quartzite chips; chert flakes; twigs; pebbles; leaves
25	DSC0031	77	twigs; pebbles; charcoal
26	DSC0032	80	pebbles; charcoal
27	DSC0033	82	pebbles; large rock; red particle @ X = 82.48; Y = 57.64
28	DSC0034	85	pebbles; large rock; charcoal
29	DSC0035	88	pebbles; rocks
30	DSC0036	91	pebbles; large rock; charcoal
31	DSC0037	93	pebbles; flake; charcoal
32	DSC0038	96	pebbles; flake; charcoal
33	DSC0039	98	pebbles; core fragment; charcoal
34	DSC0040	100	pebbles; leaves; charcoal
35	DSC0041	102	pebbles; large core fragment; charcoal
36	DSC0042	104	pebbles; charcoal
37	DSC0043	105	twigs; pebbles; charcoal
38	DSC0044	107	twigs; pebbles; charcoal
39	DSC0045	109	large twig; pebbles; large rock; charcoal
40	DSC0046	110	twigs; pebbles; flake; charcoal
41	DSC0047	112	pebbles; charcoal
42	DSC0048	114	large twig; pebbles; large flake
43	DSC0049	115	pebbles; rocks
44	DSC0050	117	twigs; pebbles; core fragment; red particle
45	DSC0051	119	twigs; pebbles; large rock; rocks
46	DSC0052	120	twigs; pebbles; charcoal
47	DSC0053	121	twigs; pebbles; charcoal
48	DSC0054	121.5	twigs; pebbles; rocks
49	DSC0055	122	twigs; pebbles; charcoal
50	DSC0056	122.5	twigs; pebbles; rocks
51	DSC0057	123	twigs; pebbles; charcoal

Peel	Image #	Depth (mm)	Findings, Coordinates, Date
52	DSC0058	124	twigs; pebbles; charcoal
53	DSC0059	125	twigs; pebbles; charcoal; red ochre chip
54	DSC0060	128	twigs; pebbles; charcoal
55	DSC0061	130	twigs; pebbles; charcoal
56	DSC0062	132	twigs; pebbles; charcoal
57	DSC0063	135	twigs; pebbles; charcoal
58	DSC0064	137	twigs; pebbles; charcoal
59	DSC0065	139	pebbles; charcoal
60	DSC0066	142	pebbles; charcoal
61	DSC0067	144	shell; pebbles; charcoal
62	DSC0068	146	pebbles; charcoal; chert flake
63	DSC0069	149	large root; pebbles; charcoal; red particle
64	DSC0070	151	pebbles; charcoal
65	DSC0071	153	pebbles; charcoal; chert flake
66	DSC0072	156	pebbles; charcoal; chert flake; ochre nodule
67	DSC0074	158	pebbles; large rock; charcoal
68	DSC0075	160	pebbles; large rock; charcoal
68	DSC0076	163	pebbles; large rock; charcoal; animal burrow
70	DSC0078	166	pebbles; charcoal; shell; chert flake
71	DSC0079	168.8	pebbles; charcoal
72	DSC0080	170	twigs; pebbles; charcoal
73	DSC0081	171	twigs; pebbles; charcoal
74	DSC0082	173	pebbles; 2 small flakes; charcoal
75	DSC0083	175	pebbles; charcoal (good sample)
76	DSC0084	176	twigs; pebbles; charcoal
77	DSC0085	177	pebbles; charcoal
78	DSC0086	179	round seed (?); twigs; pebbles; charcoal
79	DSC0087	180	twigs; pebbles; yellow ochre fragment; AMS dated on charcoal to 1000 B.P.
80	DSC0088	181	twigs; pebbles; charcoal
81	DSC0089	183	twigs; pebbles; charcoal; seashell
82	DSC0090	184	twigs; pebbles; flake; charcoal
83	DSC0091	185	twigs; pebbles; charcoal
84	DSC0092	187	twigs; pebbles; charcoal
85	DSC0093	188	twigs; pebbles; charcoal
86	DSC0094	189	twigs; pebbles; flake; charcoal
87	DSC0095	191	twigs; pebbles; flake; charcoal; seashell
88	DSC0096	192	twigs; pebbles; charcoal
89	DSC0097	193	twigs; pebbles; charcoal
90	DSC0098	195	twigs; pebbles; charcoal; core fragment
91	DSC0099	196	rodent tooth; twigs; pebbles; charcoal
92	DSC0100	197	twigs; pebbles; charcoal; tiny shells
93	DSC0102	198	twigs; pebbles; charcoal
94	DSC0103	199	twigs; pebbles; charcoal
95	DSC0104	200	twigs; pebbles; flat rock tablet; charcoal
213_1	DSC0107	213	twigs; pebbles; charcoal
213_2	DSC0109	222	twigs; pebbles; charcoal
213_3	DSC0110	231	twigs; pebbles; charcoal
213_4	DSC0111	240	twigs; pebbles; charcoal
213_5	DSC0112	249	twigs; pebbles; charcoal
213_6	DSC0113	256	twigs; pebbles; charcoal
213_7	DSC0114	268	rodent tooth; twigs; pebbles; charcoal
213_8	DSC0116	280	twigs; pebbles; charcoal

Peel	Image #	Depth (mm)	Findings, Coordinates, Date
213_9	DSC0117	292	twigs; pebbles; charcoal
213_10	DSC0118	304	twigs; pebbles; charcoal
213_11	DSC0120	316	roots; pebbles; charcoal
213_12	DSC0121	325	roots; pebbles; charcoal
213_13	DSC0122	340	roots; pebbles; charcoal
213_14	DSC0123	355	roots; pebbles; charcoal
213_15	DSC0124	370	roots; pebbles; charcoal
213_16	DSC0125	385	roots; pebbles; charcoal
213_17	DSC0126	400	roots; pebbles; charcoal
213_18	DSC0127	408	roots; pebbles; charcoal
213_19	DSC0128	415	roots; pebbles; charcoal
213_21	DSC0130	430	roots; pebbles; charcoal
213_22	DSC0131	438	roots; pebbles; charcoal
213_23	DSC0132	446	roots; pebbles; flake; charcoal
213_24	DSC0133	457	roots; pebbles; charcoal
213_25	DSC0134	468	roots; pebbles; big flake; charcoal
213_20	DSC0129	422	roots; pebbles; charcoal
213_26	DSC0135	479	roots; pebbles; charcoal
213_27	DSC0136	510	roots; pebbles; charcoal
213_28	DSC0137	521	roots; pebbles; charcoal
213_29	DSC0138	532	roots; pebbles; charcoal
213_30	DSC0139	540	roots; pebbles; charcoal
213_31	DSC0140	550	roots; pebbles; charcoal
213_32	DSC0144	560	roots; pebbles; charcoal
213_33	DSC0145	570	roots; pebbles; charcoal
213_34	DSC0147	580	roots; pebbles; charcoal
213_35	DSC0148	580	roots; pebbles; charcoal
213_36	DSC0149	600	roots; pebbles; charcoal

gravels occur throughout the deposit, and twigs and leaves were found above 304 mm. The cohesive, fine sand to sandy loam sediments appear to have been derived from roof/wall exfoliation, aeolian deposits, local plant residues, and cultural deposition without any evidence of alluviation or apparent introduction of the charcoal from older deposits/sources. Animal burrowing appears minimal overall.

What is clear is that there is the presence of in situ remains of fragments of the painted figure above and pigment/ochre remains likely from the painting or from the painting process. This includes possible ochre at 44 mm and particles or chips at 117, 149, and 180 mm (Figure 11). An ochre-colored nodule was found at 156 mm, and a red pigment-covered chip was recovered at 125 mm. What is significant about this last pigment-covered spall is that is can be fitted in the wall pictograph from which it came. This alone suggests a relatively stable sedimentary deposit. The evidence also implies that Montevideo art was made or enhanced over stages through revisits from the coast and/or elsewhere.

The peel with the painted spall that fits within the pictograph panel posed an ideal level for attempting to date the spall event and hence a time sometime following pictograph manufacture (Figure 12). However, the lowest recovered pigment fragment at 180 mm was dated. Associated charcoal was sent to Beta Analytic lab for AMS dating. The result is a measured radiocarbon age of 830 ±40 B.P. or a conventional radiocarbon age of 980 ±40 B.P., with a 13C/12C ratio of -16.1 parts per thousand and a twosigma calibration of cal A.D. 990 to 1160 (cal B.P. 960-790) (Beta-268557). This would place the date in the Late Archaic period or the early part of the Comondú

Figure 11. Montevideo red ochre in Peel 79 (180 mm depth). (Photo by Bryan Gordon, 2008.)

period.

Clearly, this one age determination is not sufficient to date the time of the manufacture of this panel at Montevideo or to date the site as a whole. It is consistent with the one obsidian hydration reading discussed earlier. It suggests that there were late prehistoric people at this site and that the painted panel is likely older than about 800 years. Furthermore, the effectiveness of this approach for indirect dating of the art is unmistakable, and other samples are available for further dating.

Conclusions

Obviously, dating of rock art is not an end in itself. Rosenfeld (2000:56) argues that "ultimately what is of primary relevance about dating in archaeology is not the age as such, but the temporal positioning of the thing dated in relation to other archaeological material." The senior author (Ritter 1991:28) stated some time ago that "further definitions of style, motif assemblages, and chronology, of the semiotics of art, and of chronological placement will continue to be important topics." This is no less true today despite many inroads discussed above.

Dating the Northern Abstract style of rock art in Baja California with any confidence is

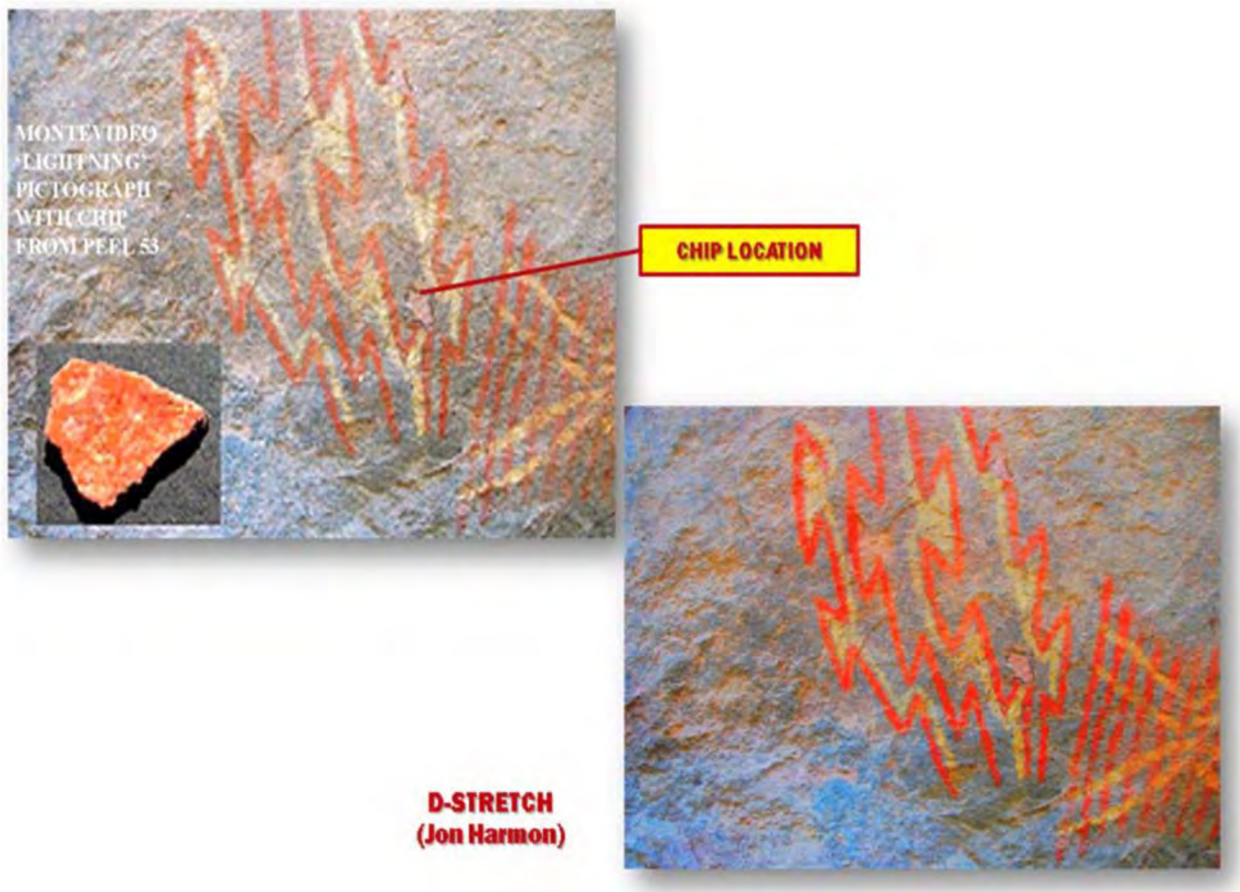

Figure 12. Montevideo panel pictograph chip. (Photo composite to the left by Raymond Cheng, 2008; photo to the right by Bryan Gordon, 2008.)

still in the future. There are no historic images as yet known in the style, and so far surface observations and excavations at sites in the vicinity of such rock art sites have failed to yield contact-era artifacts. Associated dates and assemblages from the four focus sites discussed here (Cueva Abraham, Montevideo, Las Tinajitas, and La Angostura) suggest these sites date from about 500-1,000 years ago back to perhaps 3,000 years. Two of the sites have Great Mural figures that could also fit within this time period following Hyland (2006), or possibly older based on work of other scholars presented previously. In fact, the one Great Mural anthropomorph at Montevideo has a white abstract design superimposed on it, suggesting some antiquity for this figure.

There is no doubt that dating rock art is still a tenuous proposition with great promise. There are many applications, and new approaches and techniques will no doubt be forthcoming, or, as in the case applied at several sites discussed herein, improved. Some of this experimentation has yet to reach the peninsula, but on the other hand rock art in Baja California has been at the forefront of a number of the dating methods and will no doubt continue to be so, partly owing to its abundance, complexity, visibility, and world-wide recognition. It is clear that the best approach is to apply multiple dating techniques, relative and absolute, to the extent possible within the range of budgets and available labs/expertise.

We have presented some findings based on a brief examination of peninsular rock art dating and association studies, a multifaceted approach to rock art sites and their chronological, environmental and cultural setting. It is axiomatic that one must keep in mind in their research that these sites were part of a broader cultural system or systems and were focal points as such in the landscape for communication, interaction, and socio-religious acts.

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