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The Archaeological Collection from Ludlow Cave, South-Central Mojave Desert, California

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LUDLOW Cave (CA-SBR-1887), also known as Two Raven Cave, was first formally recorded by E. W. Shepard in 1958. A complex and confusing trail of documentation follows this initial recordation. Shepard made several trips to the site, collecting artifacts which were subsequently turned over to the San Bernardino County Museum in the early 1960s. His records make reference to vandalism, but the degree of disturbance is unknown. The museum agreed to loan the collection to California State University, Bakersfield (CSUB), to be catalogued and The purpose of this paper is to analyzed. present a summary of the site history and recovered materials contained in the Ludlow Cave collection.

LOCATION AND SETTING

Ludlow Cave is located in the eastern foothills of the Bullion Mountains approximately 9 km. (5.5 mi.) southeast of Ludlow, California (Fig. 1). The cave is situated about 30 m. (100 ft.) above a north/south trending seasonal drainage at an elevation of 550 m. (1,800 ft.) above sea level, and the entrance is on an east-facing slope (Fig. 2). The mouth of the shelter is approximately 3.7 m. wide and 4.3 m. in height. In the drainage, 98 m. south-southeast of the shelter opening, a large boulder containing a bedrock mortar was discovered by the author.

The cave is in a complex of low hills comprised of reddish brown volcanic rock. It is pro-

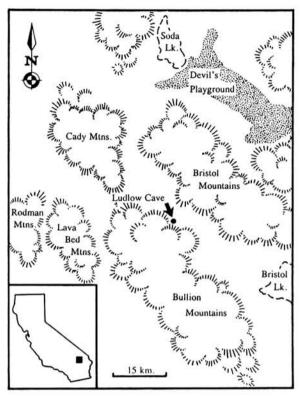


Fig. 1. Vicinity map of Ludlow Cave (CA-SBR-1887).

bable that it was formed as a gas pocket in the lava and was then exposed via erosional processes (Downs et al. 1959:5). A plan view map of the cave is presented in Figure 3.

CULTURAL SETTING

Ludlow Cave is positioned in an area where the territories of three distinct ethnographic cultures—the Serrano, Vanyume, and Chemehuevi—are all contiguous. The Vanyume, about whom little is known (Kroeber 1925:614-615), occupied the land northwest of the cave and are generally considered to be a branch of the Serrano, inhabitants of the region to the southwest. The Chemehuevi to the east are a

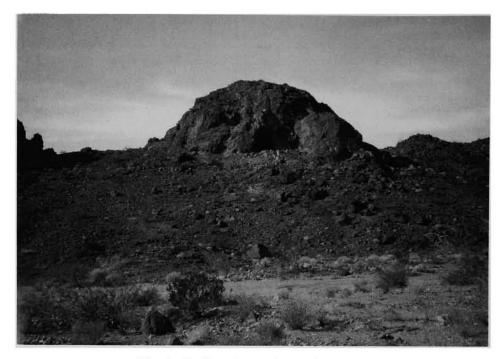


Fig. 2. Ludlow Cave (view to the west).

group closely related to the Southern Paiute (Kelly and Fowler 1986:368) and it has been hypothesized that they moved into the area shortly before ethnographic contact, probably replacing the Desert Mohave, who appear to have preceded them (Kroeber 1959:261-262; Sutton 1986:74-75; Lerch 1990:9).

FIELD METHODS

Little is known about the field methods employed. E. W. Shepard (personal communication, 1988) stated that he did "no excavation, and only surface picking around the cave." However, a sketch map included with the site record form appears to be in Shepard's handwriting and clearly indicates a stratigraphic profile of the deposit. The site record contains a series of dated photographs. Photos from April 1960, January 1961, April 1962, November 1962, and February 1973 are included. The pictures from April 1960 and January 1961 show people actively excavating, and one of the November 1962 photos shows an individual car-

rying a bucket and shovel walking away from the cave toward a jeep.

The site was again recorded in March 1973 by R. E. Reynolds for Gordon Adams (perhaps the February 1973 photographs were taken by Adams). Sometime before 1986, Paul Reeves excavated a one-by-one-foot hole down to bedrock somewhere within the cave and recovered "charcoal and tools plus many small bones" (personal communication, 1988). He also collected some fossilized bones from "just in front of the cave" (personal communication, 1988), and some of this material has been identified as being that of extinct Pleistocene fauna. The items collected by Reeves have since been reunited with the rest of the collection.

The only stratigraphic information available is from the aforementioned sketch map. Notes on this map state

The cave was filled with blow sand to 6 ft. 7 in. at the rear end and tapered down to 5 ft. at front. 2 feet of blow sand was underlain by 7 1/2 in. of water worn debris, then came 3 in. of red clay,

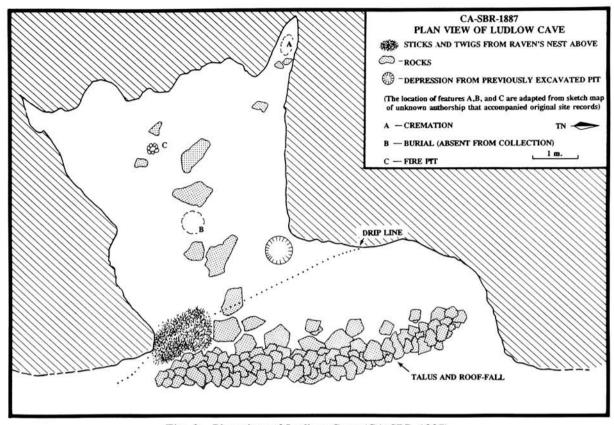


Fig. 3. Plan view of Ludlow Cave (CA-SBR-1887).

below this to bed rock was again blow sand. Indications of habitation through out all levels.

The map also depicts a cremation on the surface (probably the one in the collection, see below), and a burial located toward the mouth of the cave at a depth of 60 cm. No unburned human remains were present in the collection.

Since the materials from CA-SBR-1887 lack provenience, this paper can offer only a brief description of the collection (which is curated at the San Bernardino County Museum under accession number CA-SBR-1887).

MATERIAL CULTURE

A total of 137 artifacts is in the museum collection from Ludlow Cave, most of which is debitage (86.1%). It is clear from the site records, sketch map, and photographs that not all of the cultural remains originally located in

the cave are represented in the collection. The metric attributes of all artifacts in the museum collection (except debitage) are presented in Table 1 and some are described below.

One metate fragment, with grinding apparent on only one surface, is included in the collection. Site documentation and photos refer to other manos and metates (at least two) but their whereabouts are unknown.

Two projectile points are present in the CA-SBR-1887 assemblage. The first specimen is a complete Desert Side-notched point (Fig. 4a) and the second is the tip of a larger implement (Fig. 4b). Additionally, a complete chert Cottonwood Triangular point was observed by the author on the surface near the mouth of the cave but was not collected.

Immunological analysis of both projectile points was performed by the Laboratory of Ar-

Table 1				
ATTRIBUTES	OF	FORMED	ARTIFACTS.	CA-SBR-1887

Cat. No.	Artifact	Material	Length (mm.)	Width (mm.)	Thickness (mm.)	Weight (g.)	Comments	Fig.
035	metate	rhyolite	186	137	57	2,962	fragment	
002	hammerstone	basalt	121	105	70	1,011		
009	hammerstone	basalt	45	36	25	55.9		
006	projectile point	chalcedony	15.5	14.5	2.5	0.3	DSN ^a	4a
004	projectile point	chalcedony	37.3	15	7.9	3.3	fragment	4b
031	biface	chalcedony	38	28	11	10.0	fragment	
011	biface	basalt	65	42	22	58.4	fragment	
032	biface	basalt	104	53	25	111.0	fragment	
026	uniface	chert	66	57.5	19	68.8		4c
021	modified flake	rhyolite	72	52	17	66.8	201	
007	modified flake	rhyolite	47	30.5	9	10.2	-	
001	core	basalt	110	107	57	499.6	-	
003	core	rhyolite	121	111	78	710.8	multidirectional	
019	core	chert	69	51	34	80.5	bifacial	
020	core	chert	73	55	54	176.3	-	
022	core	chert	54	53	28	80.0		
023	core	chalcedony	81	63	48	162.5		
024	core	jasper	42	29	20	25.1	unidirectional	
005	"palette"	granitic	83	59	14.5	92.2		
800	nodule	obsidian	50	42	31	69.9		
068	cordage	unknown	7	***		0.07		

a Desert Side-notched

chaeological Science at CSUB to determine whether any protein residues were present. Each artifact was tested against the following antisera: deer, elk, pronghorn, human, mouse, rat, cat, dog, guinea pig, chicken, sheep, rabbit, and yucca. The Desert Side-notched point revealed traces of pronghorn (*Antilocapra americana*) protein, while the fragmented tip did not react to any of the anti-sera. During the historical period this species was not found in the central Mojave Desert nor is it represented in the late prehistoric archaeological assemblages of this region (Langenwalter et al. 1983:111; Sutton

and Yohe 1989:146; Hall and Basgall 1990:4).

The collection contains a total of 118 pieces of debitage, the greatest portion of which is basalt (58; 49.2%). The second most abundant material in this category is chert (38; 32.2%) followed by chalcedony (16; 13.6%). The remaining debitage consists of jasper (5; 4.2%) and rhyolite (1; 0.8%).

A tabular piece of granitic stone is present and has some unidentified resinous material on one surface. It is possible that this artifact was used as a palette to mix or apply some sort of mastic, such as lac scale resin (Sutton 1990).

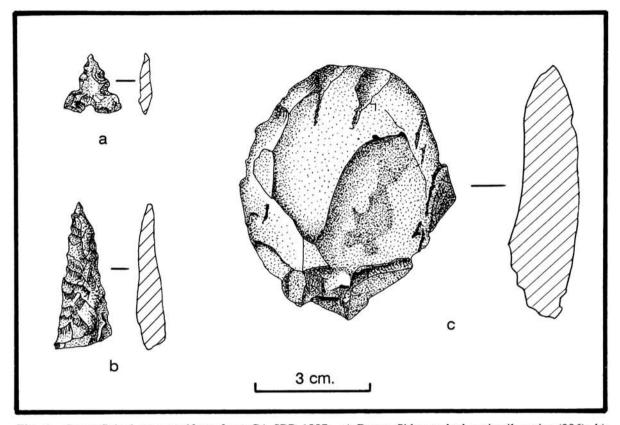


Fig. 4. Some flaked stone artifacts from CA-SBR-1887: a) Desert Side-notched projectile point (006); b) projectile point tip (004); c) chert uniface (026).

A single complete nodule of obsidian, sometimes called an "Apache tear," was recovered from the shelter. The source of this nodule could not be determined through trace element analysis, and hydration analysis yielded a result of NVH (no visible hydration).

Five small fragments of fire-affected rock are included in the collection. A "fire pit" is depicted in the sketch map, but it is not known whether these fragments were associated with that feature.

One small piece of cordage was recovered. The fragment found at Ludlow Cave is two-ply, S-twist and dark brown in color. The cordage material could not be identified, but in the central and eastern Mojave Desert the principal materials used in the manufacture of cordage were Indian hemp (Amsonia spp.) and yucca

(*Yucca* spp.) (Kroeber 1925:615; Drucker 1937:21; Bean and Smith 1978:571; Davis and Smith 1981:72; Echlin et al. 1981:55).

Two small fragments of shell are present in the collection and are thought to represent the remains of artifacts. The first is quite small and was identified only as abalone (Haliotis sp.) Dimensions of the specimen are 15.0 x 8.9 x 1.5 mm., and it weighs 0.30 g. The second piece of shell measures 11.2 x 9.9 x 0.65 mm., and weighs 0.07 g. It is either abalone (Haliotis sp.) or mussel (Mytilus sp.). Once again, due to the small size of the fragment, specific identification was not possible. Since both are rocky shore species, it can be assumed that they originated in the Pacific Ocean as opposed to the Gulf of California. Haliotis is a rare commodity in the eastern Mojave Desert, although one complete

black abalone (*H. cracherodii*) shell was recovered from Mitchell Caverns (Pinto 1989: 91).

FAUNAL REMAINS

Due to the disturbed state of the cave and the uncertainty regarding cultural activity, the faunal remains have been addressed only in a cursory fashion. The collection (Table 2) contains faunal material that is typical of modern Mojave Desert assemblages as well as the fossilized remains of extinct taxa (Table 3).

Bone preservation of the extinct taxa (which probably date to the late Pleistocene) ranges from extremely desiccated to partially mineralized. Identified taxa include the Shasta ground sloth (Nothrotheriops shastensis) and the large-headed llama (Hemiauchenia macrocephala). Tentative identification was also made of extinct dwarf prongbuck (Capromeryx) and horse (Equus sp.). It must be noted that no association between any human activity and the extinct fauna was in evidence.

From a total of 21 separate elements of extinct fauna, at least 11 (52.4%) were identified as juvenile. It is probable that some of the small/medium mammal or unidentified fragments are also from juveniles. This sample is likely a reflection of the fact that juveniles are easier to take by predators.

Thirty specimens of desiccated feces were collected from Ludlow Cave, none of which are human.

FLORAL REMAINS

A variety of whole and fragmented seeds, nuts, legumes, and gourds are contained in the collection. None of these items had provenience and it was not possible to ascertain whether they entered the cave as a result of human activity or natural means, such as wind or animals.

With one exception, the identifiable floral remains recovered from CA-SBR-1887 are fairly typical of those found in the biotic communities of the south-central Mojave today. These plants

include mesquite (*Prosopis* spp.), gourds (*Cucurbita* spp.), catclaw (*Acacia greggii*), cheesebrush (*Hymenoclea salsola*), and others. The one specimen unique to the current environmental setting of Ludlow Cave is a single pinyon (*Pinus* cf. *monophylla*) nut. Pinyon-juniper woodlands were widespread in the Mojave Desert during the last glacial period (Spaulding 1990:195); however, current data suggest that species belonging to this plant community were not present below 850 m. after approximately 9,000 B.P. (Spaulding 1990:169).

HUMAN REMAINS

A human cremation, consisting of 67 fragments of bone and weighing a total of 614.7 g., was recovered from the site. The remains appear to be those of a single individual whose sex could not be determined. A portion of the mandible is present and exhibits a great deal of resorption, indicating that it was probably from an older individual. A radiograph of the mandible showed no unerupted teeth. No pathologies were noted on any of the elements.

A sample of the bone (162.02 g.) was submitted for radiocarbon analysis, returning an assay of $5,960 \pm 130$ radiocarbon years B.P. (RCYBP) (Beta-44408). A second sample of approximately 110 g. was submitted to verify the initial date. Unfortunately, several of the sample fragments had, at some time, been refitted using Duco Cement, rendering them ineligible for the radiocarbon process. Not enough uncontaminated bone remained to initiate a third assay using conventional techniques; however, an additional date (or dates) could be obtained by employing the accelerator mass spectrometry (AMS) technique.

Two other early dates of cremations have been recently reported in southern California. Directly dated human remains from the Hi-Card Ranch Site (CA-RIV-1806; McCarthy 1986) produced a date of $2,615 \pm 100$ RCYBP, and bone from a cremation at Los Flores Ranch (CA-SBR-

Table 2	
UNFOSSILIZED FAUNAL REMAINS CONTAINED IN	N THE CA-SBR-1887 COLLECTION

Taxon	Common Name	NISP ^a	В	\mathbf{U}^{b}	WT. (g.)
Xerobates agassizii	desert tortoise	81	X	x	365.08
Sauromalus obesus	chuckwalla	7		X	2.31
Phrynosoma spp.	horned lizard	6		X	0.55
Lacertilia	unident. lizard	9	\mathbf{x}	X	0.79
Crotalus sp.	rattlesnake	1	X		0.11
Serpentes	unident. snake	1		X	0.08
Aves	unident. bird	38	X	X	38.00
Sylvilagus audubonii	cottontail	4	X	X	1.81
Lepus californicus	jackrabbit	134	X	X	122.23
Artiodactyla		12	X	X	100.34
Rodentia	**	244		X	13.31
Mammalia (rabbit-sized)		151	X	X	21.44
Mammalia (medium-sized)	1440	76	X	X	47.48
Mammalia (deer-sized)	**	38	X	x	151.76
Mammalia (unidentified)	224	8		x	2.17

a number of identified specimens

6580; Sutton et al. 1993) dated to 3,210 \pm 50 RCYBP. These dates suggest that perhaps cremation and inhumation were practiced coevally and at an earlier period than was formerly thought.

Much of the bone was not completely burned, with some portions evidencing little or no charring. The documentation that accompanies the collection indicates that this cremation was found on the surface in an alcove at the rear of the shelter. Existing information is not complete enough to determine whether this was a primary or secondary cremation. The sketch map also depicted an inhumation in the center of No completely unburned human the cave. material was encountered, suggesting that either the inhumation had been removed or that the unburned material had been incorrectly identified by the individual who drew the map.

DISCUSSION

The collection discussed above represents an accumulation of archaeological materials that were removed intermittently from the Ludlow Cave site by avocationalists and deposited at the San Bernardino Museum. Included in the collection are the remains of several extinct Pleistocene animals, a human cremation that has been tentatively ascribed (by way of radiometric dating) to the middle Holocene, and artifacts that are probably late prehistoric in age. There is little or no provenience for any of these materials, and there is no evidence of association between the Pleistocene fauna and any cultural activity.

The date of nearly 6,000 radiocarbon years B.P. for a human cremation is significant in that it extends this practice farther back in time than

^b B = burned, U = unburned

Taxon	Common Name	NISP ^a
Nothrotheriops shastensis (juv.)	Shasta ground sloth	1
Hemiauchena macrocephala (juv.)	large headed llama	2
Canis latrans	coyote	2
? Hemiauchena macrocephala	large headed llama	1
? Hemiauchena macrocephala (juv.)	large headed llama	1
? Equus spp.	horse	1
? Capromeryx spp.	dwarf prongbuck	1
small mammal		2
medium mammal		2
medium mammal (juv.)	22	2
large mammal	44	1
unidentified		5

Table 3
FOSSILIZED FAUNAL REMAINS CONTAINED IN THE CA-SBR-1887 COLLECTION

had been previously thought in the Mojave Desert. Obtaining a corroborative radiometric assay of the cremation to substantiate the initial date would, therefore, be an important component of future research. This is especially so since the only other temporally sensitive cultural materials are two Late Period projectile points.

Ludlow Cave is interpreted as a habitation site that would have provided a sanctuary within which individuals could escape the temperature extremes common to the area. It is possible that in prehistory, the adjacent wash (presently dry) may have provided a reliable, or semi-reliable, water source. The presence of milling equipment, especially the nonportable mortar located adjacent to the shelter, implies more than a casual occupation of this camp site.

While it seems unlikely, based on the documentation that accompanies the collection, that any undisturbed deposit remains in the cave, this possibility cannot be entirely ruled out. It should also be noted that the apron is covered with rock debris that could be sealing additional cultural material.

Ludlow Cave is another example of the damage that "pothunting" activities, be they malicious or well-intended, can do to the archaeological record.

NOTE

1. The following are the trace element data for the single obsidian nodule contained in the Ludlow Cave collection: RB = 218.98 ppm; SR = 200.91 ppm; ZR = 134.93 ppm; SUM = 554.82 ppm; RB 39.47%; SR 36.21 %; ZR 24.32 %.

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a number of identified specimens

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Excavation and Analysis of a Stone Enclosure Complex in San Diego County

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THIS report documents the excavation and subsequent analysis of a complex of circular stone features designated Feature G of Locus 1, CA-SDI-5938, located in a granite bedrock outcrop on a high knoll overlooking San Pasqual and Westwood valleys in San Diego County (Fig. 1). Investigations of CA-SDI-5938 were conducted by WESTEC Services in the winter of 1985-86 (Carrico and Kyle 1987:1-1). The site is composed of four loci located on both sides of a large seasonal drainage. The outcrop containing the enclosure complex is roughly oval and measures 22 m. east/west by 12 m. north/south. The bedrock outcrop and terrain immediately to the west are relatively level, forming a shelf. The ground rises to the north at a moderate angle and drops off steeply to the south and east.

The complex is similar in construction to others previously recorded in San Diego County

(May 1975; Minor 1975; Oxendine 1981). It consists of circular to semi-rectangular enclosures built of stacked native stone. bedrock boulders have been incorporated into the walls. Walls, where intact, were approximately 0.5 to 1 m. in height. Recent vandalism had destroyed and altered the shape of rooms in the center of the feature. The sizes of well-defined enclosures ranged from approximately 1 by 1 m. to 3 by 2.5 m. One large area, designated Room 14, measured 3.7 by 4.0 m. This was not a walled enclosure, but a natural open area located on the east end of the complex. Although surrounded by large bedrock boulders that have been incorporated into other rooms, this area had apparently never been enclosed. It contained dark artifact-bearing midden, as did all the rooms. A small pictograph is located on the southeast corner of the complex.

The presence of rock rooms and enclosures in San Diego County has been reported increasingly by several researchers (May 1975; Minor 1975; Oxendine 1981; Taylor and Carrico 1982). They have commonly been described in the literature as defensive and habitation structures, or storage areas (May 1975; Minor 1975). These enclosures are stacked or tiered rocks arranged in such a manner to form a circle or The features are rarely more than three tiers in height and vary in size from relatively small (2 m. in diameter) to large (4 m. in diameter). At least 28 sites in San Diego County are reported to have rock rooms or enclosures. These structures are most often built into bedrock formations or outcrops, although their bases are frequently sunk into A Horizon Excavation within these features has soils. produced artifacts and refuse clearly associated with habitation, including formalized tools, faunal remains, and ornamentation.

The goal of the excavation of the stone enclosure complex at CA-SDI-5938 was to determine function through artifact analysis. If the features were defensive or storage structures, a