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An AMS Radiocarbon Date from the Tank Site, CA-LAN-1, Topanga Canyon, California

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This paper provides the first radiocarbon date from CA-LAN-1, also known as the Tank Site. This important prehistoric site, long considered the "type site" for the Milling Stone Horizon (MSH), had never previously been radiocarbon dated. Some six decades after the site was first investigated, we provide the date and its specific context, its conventional and calibrated ages, and discuss the significance of this singular date to southern California prehistory.

California State Parks embarked on the formulation of a General Plan in 2010 for Topanga State Park, which is situated in the central Santa Monica Mountains of southern California (Fig. 1). New cultural resource inventories were conducted by California State Parks archaeologists in preparation for the General Plan. Twenty-three archaeological sites were identified in the park, including the important and celebrated Tank Site, CA-LAN-1, the first site recorded in Los Angeles County. The site record for CA-LAN-1 was updated during the General Plan process and a nomination for listing on the National Register of Historic Places (NRHP) was written. The moniker for the Tank Site derives from the still-standing, large metal water tank that was placed on top of the site sometime prior to its discovery in 1946. Archaeological investigations began immediately after the 1946 discovery and continued on an intermittent basis until 1961. The Tank Site came under California State Parks management in 1973.

The General Plan was approved by the Parks and Recreation Commission in the fall of 2012. The Commission also created a protective internal unit around the Tank Site, the 158-acre Topanga Cultural Preserve, to offer additional preservation, interpretation and focused management for CA-LAN-1 and the surrounding associated sites.

The National Register nomination (Green 2015) recognizes CA-LAN-1 as the "Topanga Culture" type site that defines a distinctive archaeological pattern of California prehistory for the archaeological culture known as the Milling Stone Horizon (MSH) and also for the significant contributions to archaeological field methods applied there during the initial site investigations in the 1940s.

A result of the nomination process, California State archaeologists sought to obtain absolute dates for LAN-1 from materials recovered during previous investigations of the site. Ultimately, as detailed below, a single radiocarbon assay was obtained for this renowned deposit.

CA-LAN-1

The Tank Site is located in Topanga Canyon, an approximately seven-mile-long north/south trending canyon situated southwest of the San Fernando Valley in Los Angeles County. The canyon is drained by Topanga Creek, which empties into the Pacific Ocean at Santa Monica Bay (Fig. 2). The site is strategically situated on a small, oak-covered knoll 1,371 m. above sea level and approximately 6.5 km. from the ocean. This area of the Santa Monica Mountains can receive upwards of 20 inches of rain annually, producing a lush setting of grassy meadows that transition into dense oak woodland. The vegetation on and immediately around the site is typical of the Santa Monica Mountains, consisting of a mixture of chaparral species (ceanothus, chemise), coastal sage (coyote brush, toyon, California sage), and oak grassland (coast live oaks, various grass species), while in the riparian zones sycamores and willows are typical.

The site covers approximately 70, 450 $m.^2$ and varies in depth from 30 to roughly 120 cm., with an average depth of 80 cm. (Mealey et. al 2011). The soils are described as "heavy green-gray clay" (Heizer and Lemert 1947:238)… [that had]…"lost all the diagnostic characteristics usually associated with habitation deposits" (Treganza and Malamud 1950:130). Excavation revealed three basic stratigraphic layers: layer A, consisting of the

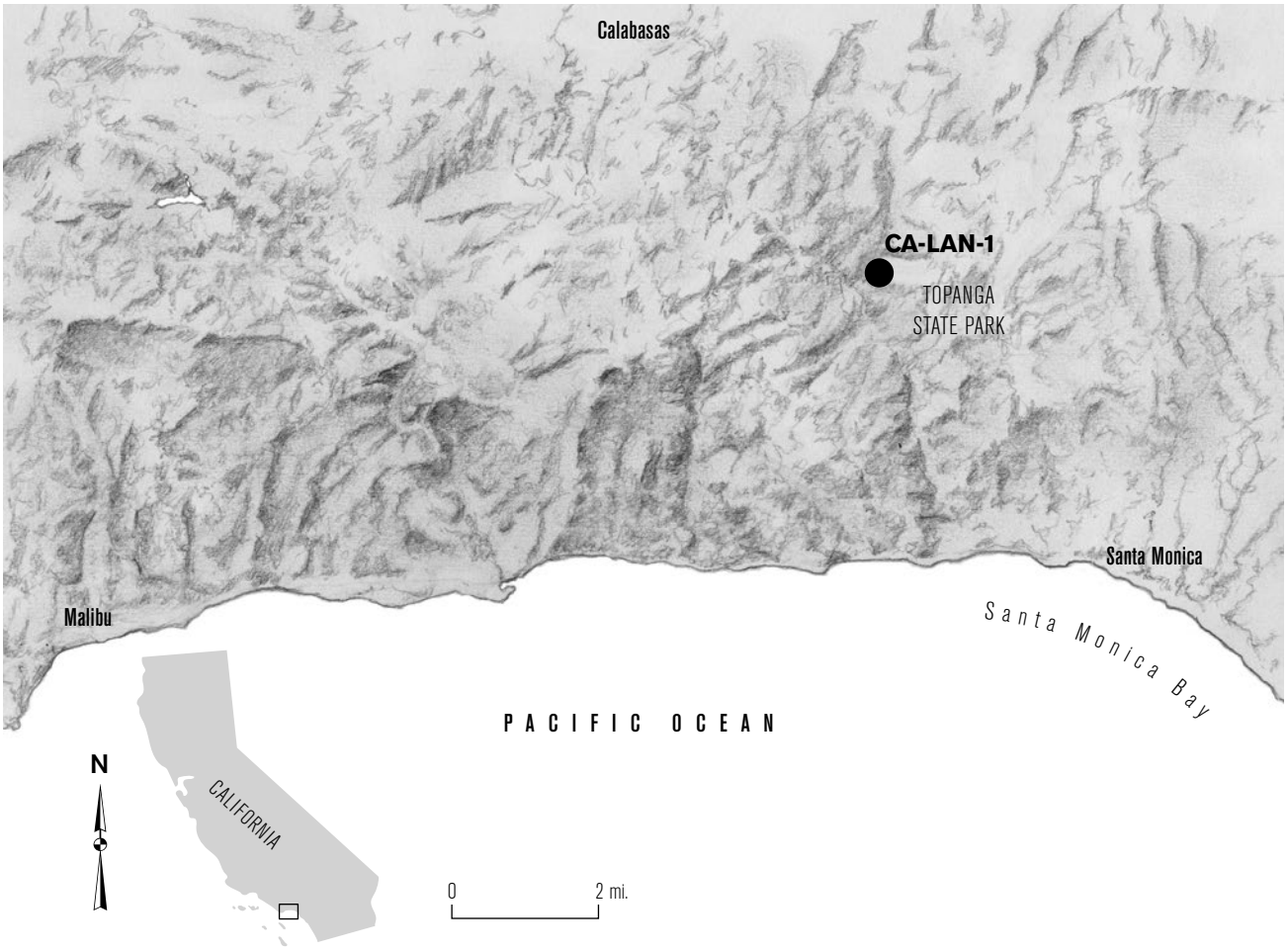

Figure 1. Map showing location of Topanga State Park and CA-LAN-1.

first five inches (12.7 cm.) and composed of top soil; layer B, the "mottled adobe-like soil" (Treganza and Malamud 1950:130) that was the heart of the site and which extended to a depth of 48 in. (122 cm.); and layer C, a distinctly altered, more friable layer containing charcoal and an occasional shell (Treganza and Malamud 1950:130). The remarkable feature of the site, which was considered to be a "village location occupied for a considerable period" (Treganza and Malamud 1950:130), was the quantity and nature of the artifacts recovered. Some 5,000 cubic feet (141.5 $m.^3$) of soil were excavated, resulting in the recovery of nearly four tons of artifacts during the first full season of work in 1947 (Treganza and Malamud 1950:131).

Initial Research

The site was recorded and initially tested in the spring of 1946 by Robert Heizer, an archaeologist from UC Berkeley, and Edwin Lemert, a sociologist from UCLA. The two had undertaken a partial survey of Topanga Canyon, which resulted in the assignment of the first series of trinomials for Los Angeles County (Kowta 1986:37). Heizer returned the following spring with Adán Treganza, then a graduate student at Berkeley, along with Dr. Ralph Beals and a graduate student, Consuelo Malamud, from UCLA. Together they excavated three 5×5 ft. "stratipits" (Heizer and Lemert 1947:238). On the basis of the promising results from these test pits, additional large-scale excavations (73 5 ft. $\times$ 5 ft. units) were undertaken that summer (Treganza and Malamud 1950). The following year (1948), another 105 5 ft. $\times$ 5 ft. pits were excavated jointly by Berkeley and UCLA personnel under the leadership of Adán Treganza and Agnes Bierman (Reinoehl 1986). These excavations produced a tremendous number of artifacts, so many in fact that "many of the core tools and mano and

Figure 2. Map showing boundary of CA-LAN-1 within Topanga State Park.

metate specimens were not saved, since they were too fragmentary for classification and study" (Treganza and Malamud 1950:131). The greatest number of artifacts consisted of handstones or manos with 2,556 specimens (Treganza 1950:75), followed by scraper planes (n = 2,008), core hammer-stones (n =1,478) choppers (n=649), and 329 milling slabs (Treganza and Bierman 1958:56–59). The last excavations at LAN-1 were conducted in 1959–1961 by Dr. Harold Nelson from Santa Monica Community College (SMCC). A large assemblage of over 4,400 artifacts was generated by SMCC, from units which were excavated in the relatively untouched northern portion of the deposit. The materials recovered there have never been fully described and are currently curated at the Fowler Museum at UCLA.

The nearby site of CA-LAN-2 was tested twice by Treganza, first in 1947 with a 12 ft. × 3 ft. trench, and again in 1948, when 28 5 ft. × 5 ft. units were excavated; about 270 artifacts were recovered from 41 m.^{3} of soil (Reinoehl 1986:2–3). LAN-2 was excavated one final time in 1957 by an archaeological crew from UCLA led by Keith Johnson (Johnson 1966). These excavations (53 5 ft. × 5 ft. pits) yielded 374 artifacts from 73.5 m.^{3} of soil (Reinoehl 1986:4). Collectively, all of these materials became diagnostic of a new cultural entity referred to as the "Topanga Type Culture" (Heizer and Lemert 1947:237), a term that has become synonymous with Milling Stone Horizon (MSH) cultures.

Preliminary Age Estimates

Heizer, Treganza, and their co-authors all correctly surmised that the lower component of LAN-1 was "relatively ancient" (Heizer and Lemert 1947:251). Coining the term "Topanga Complex," Heizer and Lemert (1947:250) drew comparisons to the work of Malcolm Rogers and his multi-phased San Dieguito

Table 1

LAN-1 ARTIFACT FREQUENCY BY DEPTH

Artifact Class	0"–6"	6"–12"	12"–18"	18"–24"	24"–30"	30"–36"	36"–42"	42"–60"	IND[a]	Total
Handstone	239	349	229	101	33	9	1	1	1,556	2,518
Millingstone									330	330
Mortar				1					2	3
Pestle									9[b]	9
Other groundstone									46	46
Scraper plane	464	601	465	242	119	65	30	22		2,008
Chopper	200	173	146	76	26	10	9	9		649
Hammer	339	422	429	154	93	17	18	15		1,487
Scraper	278	199	135	73	28	14	8	9		744
Core[c]										
Small flake tool	34	35	20	9	4	1	3		747	853[d]
Point/Biface	40	31	17	2	1	2		5		98
Other (misc.)										12
TOTAL	**1,594**	**1,810**	**1,411**	**657**	**304**	**118**	**68**	**61**	**2,687**	**8,532**

[a]IND = indeterminate provenience or fragments classified only as handstones or millingstones and not retained by original excavators.

[b]Exact depths not given; none were deeper than the 12–18" level.

[c]Not defined in original reports.

[d]Includes formed and simple flake tools not originally separated. Table revised and reformatted after Hale 2001, based on data presented by Heizer and Lemert 1947, Treganza and Bierman 1958, and Treganza and Malmud 1950.

culture, and conservatively dated the complex to between 1,200 B.C. and A.D. 900 (circa 3,150–950 B.P.). After the advent of radiocarbon dating, Treganza and Bierman (1958) suggested two phases of occupation at the Tank Site, with a pre-5,000 B.P. date for the lower component and circa 3,000–5,000 year age for the upper component. These estimates were based on a variety of observations, including the heavy patination on the artifacts recovered; the 'depleted' nature of the midden, evident in the scarcity of organic materials (bone, shell, etc.); the indurated condition of the midden; and (most importantly) the overwhelming quantities of "crude, percussion-flaked tools and basic milling implements" present (Treganza and Bierman 1958:47). The assemblage was significantly different from Rodgers' San Dieguito Complex. Treganza and Malamud concluded that "[a]t present we cannot fully equate the material aspects of this complex and those of any other known California culture" (1950:130). A re-analysis of the Tank Site assemblage that was conducted in 2001 for a master's thesis (Hale 2001) re-organized the data from the first three excavations; they are summarized here in Table 1. As shown in the table, the dominant artifacts (in descending order) are handstones, representing 29.5% of the collection; scraper planes, 23.5%; hammer stones, 17%; small flake scrapers, 9.9%; choppers, 7.6%; and millingstones, 3.8%. Significantly, mortars and pestles make up less than 1% of the total assemblage and points and bifaces make up just 1.14% of the assemblage.

This unique blend of artifacts (scrapers, hammer stones, and milling tools) was unknown at the time, and Treganza struggled in his dissertation to compare the typological attributes of the Tank Site assemblage with other "early localities with lithic industries" (Treganza 1950:12). Almost intuitively, Treganza recognized that this site was unique, for although it seemed related to San Dieguito, it had characteristics of "Oak Grove" sites on the Santa Barbara coast, first characterized by D. B. Rogers (1929). The presence of abundant milling slabs, handstones, and scrapers and the nearly total absence of mortars was a clear signal to Treganza that "the occupants of the Tank Site were strongly inclined toward a seed-gathering economy with hunting and collecting of shellfish only secondary and of little importance" (1950:121). Treganza and Bierman did not submit their final report on Topanga until 1958. By this time, William Wallace had excavated the Little Sycamore Site (CA-VEN-1) and published his seminal article, "A Suggested Chronology

for Southern California Coastal Archaeology" (Wallace 1955). Wallace considered LAN-1 to fall in the later portion of the "Horizon II Milling Stone Assemblages," along with the Little Sycamore Site, Malaga Cove II (CA-LAN-138), and La Jolla I. Wallace thought these sites and their "simple cultures" (1955:196) dated to between 2,000 and 3,000 years B.P., an age that Treganza and Bierman thought to be "too conservative to fit comfortably into any over-all generalized chronology for California" (1958:75).

Keith Johnson's evaluation of LAN-1, coupled with his excavations at LAN-2 in 1957, established similarities between the upper levels (0–18 in.) of LAN-1 and Phase II of LAN-2, which he believed dated from 3,000 to 1,000 B.C. (5,000–3,000 B.P.). Johnson's excavations yielded four charcoal radiocarbon dates from two separate features at LAN-2: 2,450 ± 150, 2,440 ± 200, 2,700 ± 150, and 2,600 ± 240 rcy B.P. On the basis of these dates, Johnson proposed three phases for the Topanga Complex (I, II, III), with only phase III having associated dates.[1] When calibrated with the CALIB 7.1 program, these dates fall between 2,359–2,755 and 2,541–3,059 cal B.P, at 1 sigma.) Twenty years later, Clement Meighan (1988) published the results of three obsidian hydration rim values (4.6, 5.6, and 4.5 microns) from LAN-1. At the time, the small sample size and lack of sourcing data offered little help in dating the site.[2]

The SMCC Excavations and Context of the Date

SMCC excavations[3] at the Tank Site explored the northern edge of the site with at least 27 units (Reinoehl 1986). A review of the existing field notes and records revealed that only five of the units extended below 24 inches in depth, and of those only one unit went below 36 inches (91 cm.). The assemblage resulting from these excavations (as previously mentioned) has yet to be fully studied, and although a thorough analysis of the collection lies beyond the scope of this paper, a preliminary examination of the assemblage was conducted at the Fowler Museum. Additionally, a review was undertaken of the existing handwritten catalogue of the artifacts collected, which provided a reasonable estimation of the composition of the assemblage.

Most of the approximately 1,300 artifacts listed in the catalogue—not counting entries that were described only as "one bag" (presumably consisting of chipped stone debitage)—were cores, scrapers, and hammer stones, along with a few handstones, no milling slabs, and a handful of bifacial tools (Table 2). This homogenous assemblage of tools was found throughout the area excavated, without any clear patterning by depth, from near the surface of the site down to an average depth of approximately 24 inches (61 cm). Notably, no projectile points, or any mortars or pestles, were found in this portion of the site.

Table 2

ASSEMBLAGE COMPOSITION OF MAJOR ARTIFACT TYPES FROM SMCC EXCAVATIONS

Artifact Types	Number of Artifacts
Handstones	27
Milling Slabs	1
Scrapers	159
Cores[a]	205
Hammerstones	35
Bifaces[b]	7

[a]Cores and hammer stones are an interchangeable artifact class for often a core was used as a hammer stone.

[b]Bifaces include artifacts listed as knives and blades

No features with sufficient datable organics were exposed during the course of the excavations, although sparse amounts of charcoal were noted in some units, but none that appeared to be definitively cultural in origin. This lack of organics was well documented by all the initial researchers who had worked at the site (see Heizer and Lemert 1947; Treganza 1950; Treganza and Bierman 1958; Treganza and Malamud 1950). Mammal bone was rare, as was shell, "making its appearance only here and there in the site deposit" (Treganza and Malamud 1950:150). Furthermore, researchers made the observation that what little shell they did find was limited to within "several inches of the surface…[and] in a fair state of preservation…[or]…found only in a badly crushed or calcined condition either under inverted metates or near the base of the site…" (Treganza and Malamud 1950:150). They suggested that the upper shell was the result of a much later occupation, and that the limited quantities of shell found deeply buried had been protected from leaching and would otherwise have been "destroyed during the process of soil alteration" (Treganza and Malamud 1950:150).

The deepest unit excavated in the deposit by SMCC by far was OR1, a single 5 ft. × 5 ft. unit that was

Table 3

RADIOCARBON DATE FROM CA-LAN-1

Lab Designation	Sample #	Marine Reservoir Δ Used	Conventional Radiocarbon Age	2 σ Calibrated Result	Intercept of Radiocarbon Age with Calibration Curve	Material Tested
Beta-277587	LAN1OR172-74	225 ± 35	5,880 ± 40	Cal B.P. 6,188 – 5,921	Cal B.P. 6,059	*Mytilus* shell

excavated over a period of several months (fall 1959 to summer 1960). This pit, which was excavated to a depth of 10 feet (305 cm.), contained bone and charcoal, as well as numerous shell fragments that began to appear at a depth of 70 inches (177.8 cm.; Moseley 1960). According to the SMCC field notes, soil samples from these lower levels were taken, but unfortunately can not now be located. As the excavator observed, below 70 inches "a gray white clay (that) looks like ash mixed in with sandstone (and a small area of)…midden-like material" was encountered (Moseley 1960). This suggests a possible feature was present, although it was never recorded as such. A search of the collections did yield a single California mussel shell (*Mytilus californianus*) from the 72–74 in. level (183–188 cm.) in this unit. The bivalve shell fragment, which weighed 0.5 grams, was found in the same level as these "burned deposits" and was the deepest reliably cultural organic material in the entire SMCC collection. With the permission of the Fowler Museum, the shell specimen was submitted for accelerator mass spectrometry (AMS) dating to Beta Analytic, and yielded a conventional radiocarbon age of 5,880 ± 40 B.P. (Table 3). Using the *CALIB 7.0 html program* and the standard delta reservoir correction of 225 ± 35, this date falls between 5,921 and 6,186 cal B.P. at 2σ , with a median probability of 6,059 cal B.P.

DISCUSSION

Although relatively few conclusions about the overall occupational history of LAN-1 can be drawn based upon a single radiocarbon assay, the date presented here does offer some insights regarding the earliest component of the site and how it fits into our current understanding of the chronology of the MSH. According to Treganza and Malamud (1950), the total depth of the area of the deposit where they excavated was 62 inches (158 cm.); therefore, the stratigraphic position of the single date from 72–74 in. (183–188 cm.) below the surface suggests that it probably represents the first occupation of the site. (Of course, other still unexamined areas of the deposit might contain even older components.)

If we assume that the site was first occupied approximately 6,000 years ago, this makes the earliest component of the site, Phase I (Johnson 1966; Treganza and Bierman 1958), considerably younger than those from numerous other MSH sites in the region that all date to well over 7,000 cal B.P. Nearby coastal sites—such as VEN-1, the Little Sycamore Site (Dallas 2001, 2004; Foster 1989; Wallace 1954); LAN-92 (Dallas and Mealy 1995); LAN-958, the Shobhan Paul Site (Porcasi and Porcasi 2002); and LAN-267, the Sweetwater Mesa Site (Gamble and King 1997; King 1967)—have all been dated in excess of 7,000 years B.P. Similarly, sites in the interior of the Santa Monica Mountains, such as CA-VEN-294 (Rosen 1978) and VEN-853, the Lang Ranch Site (Greenwood et al. 1987), also have MSH occupations greater than 7,000 years B.P. The difference of well over a thousand years between these several MSH sites is surprising if LAN-1 was indeed not occupied until circa 6,000 years ago. The suggestion that the inhabitants of the Tank Site represented a separate, interior MSH group denied access to the coast is seemingly supported by the general lack of shell remains in the deposit (the preservative qualities of the soil not withstanding). The notion of social isolation has been implied by some researchers, who have observed that the geographical position of the site (located on a knoll with a 360º view of Topanga Canyon) was defensive in nature (Gamble and King 1997).

Perhaps more noteworthy is the site's temporal position when considered within a wider geographical perspective. Research on MSH sites during the intervening decades has led to an expansion of the chronological and geographical distribution of the MSH pattern, and fundamentally shifted longstanding notions about the timing, point of origin, and cultural evolution

of the MSH (Fitzgerald 1993; Fitzgerald and Jones 1999; Jones 2008; Jones et al. 2002). Several MSH sites have now been dated between 9,000 and 10,000 cal years B.P., especially in Santa Barbara, San Diego, and San Luis Obispo counties (Rosenthal and Fitzgerald 2012). Moreover, the geographical reach of the MSH complex now extends to the North Coast Ranges, with sites in Napa and Lake counties (Fitzgerald and Jones 1999; Jones 2008; Rosenthal et al. 1995; True et al. 1974); the San Francisco Bay area, where at least three sites have been identified with MSH components dating from circa 7,000 to 9,400 cal B.P. (Cartier 1993; Fitzgerald 1993; Fitzgerald and Jones 1999; Fitzgerald and Porcasi 2003; Rosenthal and Fitzgerald 2012); and the eastern margin of the San Joaquin Valley at CA-FRE-61 (McGuire 1993; McGuire and Hildebrandt 1994).

The lengthened chronology of the MSH casts a very different light on the lower component at LAN-1, which now appears to be closer to the end rather than the beginning of the MSH for much of California. Recent studies in northern Santa Barbara County have shown that mortars and pestles began to make their appearance there no later than 5,900 cal B.P. The introduction of these new processing tools signals a conspicuous shift away from the handstone and milling tool kit of Roger's Oak Grove culture, and the possible introduction of the so-called "Hunting Culture" (Erlandson 1997; Glassow et al. 2007; Rogers 1929). Glassow suggests that in a few isolated instances, "the use of mortars and pestles may date prior to 4,500 B.C." (Glassow et al. 2007:197), or circa 6,500 cal B.P., in reference to the Aerophysics site (CA-SBA-53) where mortars/pestles and handstones/milling slabs were found intermingled in the deposit. Another example is the Sweetwater Mesa site (CA-LAN-267), located within 20 km. of LAN-1, which also contained a mix of both mortars/pestles and handstones/milling slabs, with associated dates of 6,514, 7,163 and 7,260 cal B.P.[4] These data seemingly indicate that the switch to a mortar/pestle technology was well underway at least 500 years before the first occupation of the Tank Site.

CONCLUSIONS

Ostensibly, it appears that the occupants of LAN-1 were very slow to adapt to the mortar and pestle, especially when you consider that mortars and pestles comprised only 0.2% (Gamble and King 1997:70) of the total assemblage of artifacts recovered. The lack of mortars and pestles is particularly notable in light of the fact that the SMCC assemblage was largely excavated from the upper portions of the deposit at LAN-1. According to Johnson (1966:19), this area of the deposit (0–18 in. or 0–55 cm.) represented Phase II of the Topanga Complex, for which both he and Treganza suggested dates ranging from 3,000 to 5,000 years ago, a time period during which much of California's indigenous population was adopting the mortar and pestle technology. The notable exceptions to this transition to mortar and pestle technology, of course, are the La Jollan (coastal) and Sayles and Pauma (interior) MSH complexes (Basgall and True 1985; Kowta 1969; True 1958). These regional expressions of the MSH lifeway persisted well into the Late Holocene before giving way to the San Luis Rey (Meighan 1954; True et al. 1974) and Cuyamaca complexes (True 1970). It appears that at both LAN-1 and LAN-2, MSH tool assemblages were still dominant well into the Late Holocene or Phase III of the Topanga Complex (circa 2,500 cal B.P.), suggesting a greater cultural linkage to the south than the north. It may be that Topanga Canyon formed some kind of cultural boundary between those who still practiced the old way of life and those adopting the new one that was being introduced.

Other dates may be forthcoming, but this singular date from this regionally famous site does provide current and future scholars a foundation to build upon. Those researchers who wish to do so can compare LAN-1 with other sites with similar MSH tool assemblages or features, thus increasing our collective knowledge and understanding of cultural changes during the MSH, and providing us with greater insight into such topics as comparative chronology and adaptation, and such unique traits or practices as cairn burials, which may be the beginning of communal mourning ceremonies (Hull 2011, 2012; Hull et al. 2013). Ironically, it may be that the Tank Site's greatest contribution to research lies not in being the most ancient example of the MSH, but rather in representing its last stand, when change was well underway elsewhere in California.

NOTES

[1]Johnson actually reported five dates in 1966, one derived from solid carbon and four using the carbon dioxide gas method;

two dates were given for each sample, using different size counters (5 liter and 2 liter), with the five liter being considered the most accurate (Damon and Long 1962). The solid carbon dating method was eventually phased out in favor of the more accurate gas method.

[2]In the intervening years, the obsidian providing the three obsidian hydration rim values that Meighan (1988) reported on from LAN-1 has been identified as being from Coso, which is the dominant obsidian source for southern California and for which reasonably reliable hydration rates have been established (Gilreath and Hildebrandt 1997:172). Hydration readings in the mid fours to fives for Los Angeles County correspond to the Late Period in southern California prehistory (circa 1000–650 B.P.) and thus are clearly not associated with the primary Milling Stone Horizon deposit at LAN-1.

[3]It is worth pointing out that the SMCC crew included two notable future California archaeologists, Mike Glassow and Chester King.

[4]These dates represent the calibrated median probability ages of the original radiocarbon dates of 6,310 ± 100, 6,870 ± 100, and 6,960 ± 100, utilizing the *CALIB 7.0 html program* (Stuiver et al. 2014) with a Delta R of 225 ± 35.

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