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REPORTS

An Accelerator Mass Spectrometer (AMS) Radiocarbon Assay on a Bone "Hook Stone"

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A San Nicolas Island "hook stone" manufactured of marine mammal bone was AMS dated to $3,480 \pm 60$ RCYBP. The vast majority of bird/pelican/hook stone effigies are of steatite or some other lithic material, and they are placed in the Late Prehistoric Period. If the genre begins well before Late Prehistoric times, then the earlier artifacts were probably being fashioned of less durable materials (e.g., wood). However, the early date of this "hook stone" may simply be the consequence of artisans selecting old bone to carve.

EFFIGIES variously called "bird stones," "pelican stones," and "hook stones," interpreted by some as dimorphic sexual symbols (Koerper and Labbé 1987) and by others as anthropomorphic figures (Lee 1993), are assigned to Late Prehistoric times and were probably features of magico-religious practice into the early contact period (Koerper and Labbé 1989). These artifacts are known throughout mainland and island Chumash and Gabrielino areas (e.g., Hoover 1974a, 1974b; Hudson and Blackburn 1980; Lee 1981:48; Cameron 1983; Wallace 1987). At least one steatite specimen was recovered in Luiseño territory (Koerper and Labbé 1987, 1989), and a serpentine

pelican stone was found at a site at Chilao Flats in San Bernardino National Forest (Rozaire 1958).

No definitive criteria are established in the literature to determine an ideal profile of southern California "pelican stones" or "bird stones." However, examples indisputably belonging to this class of artifact are characterized by a bulbous base, a vertical stem, and a lateral extension perpendicular to the top of the vertical stem at the point of contact. Generally, the extension tapers from the point of contact outward, often angling downward in the general direction of the bulbous base, but pointing outward from it. The base may be perpendicular to the stem or angled, sometimes as much as 45° . More often than not, the stem is characterized by rectilinear, rectanguloid, and curvilinear cross sections. It is herein suggested that these criteria may be employed to establish an "ideal" profile to determine the probability that similar forms are homologous to the classic "pelican stones" or "bird stones." Generally, creative latitude is greatest at the base, where, for instance, the normal bulbous form may be absent, replaced instead by a design element closely resembling a lateral extension, thereby forming a "hook stone."

Despite three ethnographic references to bird stones, two cursory (de Cessac 1951; Harrington 1942) and one detailing the artifact's role in a ritual laden with fertility/fecundity symbolism (Yates 1889:305; see Koerper and Labbé 1987: 113-115), Cameron (1988) posited use of the genre as limited to A.D. 800 to 1400. Indian informants in the early 1880s identified the effigies as "pajaritos" or "inhabitants of the air" (de Cessac 1951:2). Two of Harrington's informants, Luisa Ignacio and Fernando Librado, reported carved steatite "hook stones" for the Barbareño and Ventureño Chumash, respectively (1942:13-14).

Yates' (1889:305) ethnographic notes described the use of bird stones, like the specimen illustrated in Abbott (1879:215, Fig. 96), in a magico-religious ritual:

. . . twenty of [the stone effigies] were arranged in a square, five on each side, in the center was a bowl of water, beside which stood the medicine man, with a long stone pipe shaped like a cigar. . . The [pipe] smoke was first directed toward the bowl of water, then toward the stones. The people came and moistened their faces with the water of the bowl . . . This ceremony brought rain, caused death to enemies, and various other things.

Blackburn (personal communication 1986), in checking Yates' reference to Abbott (1879), confirmed that the 20 artifacts "arranged in a square" actually were bird stones, not charmstones, thereby correcting a long-standing error in the literature (e.g., Grant 1978:514).

The vast majority of "bird stones" is fashioned of steatite and cannot be directly dated. Therefore, the authors wished to locate specimens made of organic materials for radiometric assay. Since no "bird stone" had heretofore been subjected to radiocarbon analysis, it was hoped that such determinations might establish, with high confidence, a minimum antiquity for this artifact category, or perhaps further support the hypothesis of a post-A.D. 1400 occurrence of the motif in southern California aboriginal culture.

This report documents four specimens made of organic material, one of tooth and three of marine mammal bone. It further reports the surprising results of AMS dating of one of the bone specimens from San Nicolas Island (Fig. 1). AMS technology was chosen in order to minimize damage to the artifact.

DESCRIPTIONS

Four bird stone/hook stone artifacts manufactured of datable material were located within the collections of the San Diego Museum of Man. Specimen SDM 6069 (Fig. 2a) was recovered on San Clemente Island (Fig. 1) and is fashioned from a tooth, possibly that of a harbor seal (*Phoca*

vitulina). It is 1.9 cm. in length, 0.9 cm. wide, and weighs 1.19 g. Abrasion marks covering the surface of the piece resulted from removal of the enamel. The polish visible on the surface may have been by human hand or may have resulted from storage in a bag, perhaps one belonging to a shaman (P. Langenwalter, personal communication 1991).

In form, this artifact more closely resembles a "hook stone" than a "bird stone" or "pelican stone." It is nearly identical to a specimen of marine mammal bone pictured in Gifford's classic work, "California Bone Artifacts" (1940:225, Fig. AA). Gifford (1940) could assign no function to this piece, also from San Clemente Island, although he seemed to have recognized the close resemblance to hook stones. Due to the small size of specimen SDM 6069, no attempt was made to remove material for AMS analysis.

Three other specimens of marine mammal bone, all from San Nicolas Island, were selected for sampling. Specimen SN-10 (Fig. 2b) is 7.85 cm. long, 3.4 cm. wide, and weighs 39.86 g. Its form is closer to a "hook stone" than to a classic "bird stone." Specimen SN-14 (Fig. 2c) is incomplete, but it appears to be similar to the previously described example. It measures 5.2 cm. long, 2.2 cm. wide, and weighs 12.23 g. Specimen SN-Misc (Fig. 2d) more closely resembles a classic "bird stone." It is 8.1 cm. in length, 3.4 cm. wide, and weighs 39.79 g.

COLLAGEN TESTS

Prior to preparation of any AMS sample target, the three bone artifacts were tested to determine whether enough residual collagen was available for dating purposes. From the least conspicuous area of each item, a small amount of material was removed with a drill bit. A few milligrams of the resulting bone powder were used to test the organic content of each sample. First, the total carbon and nitrogen percentages were measured with a Carlo Erba NA 1500 N/C/S analyzer, and then the samples were hydrolyzed in 6N hydrochloric acid

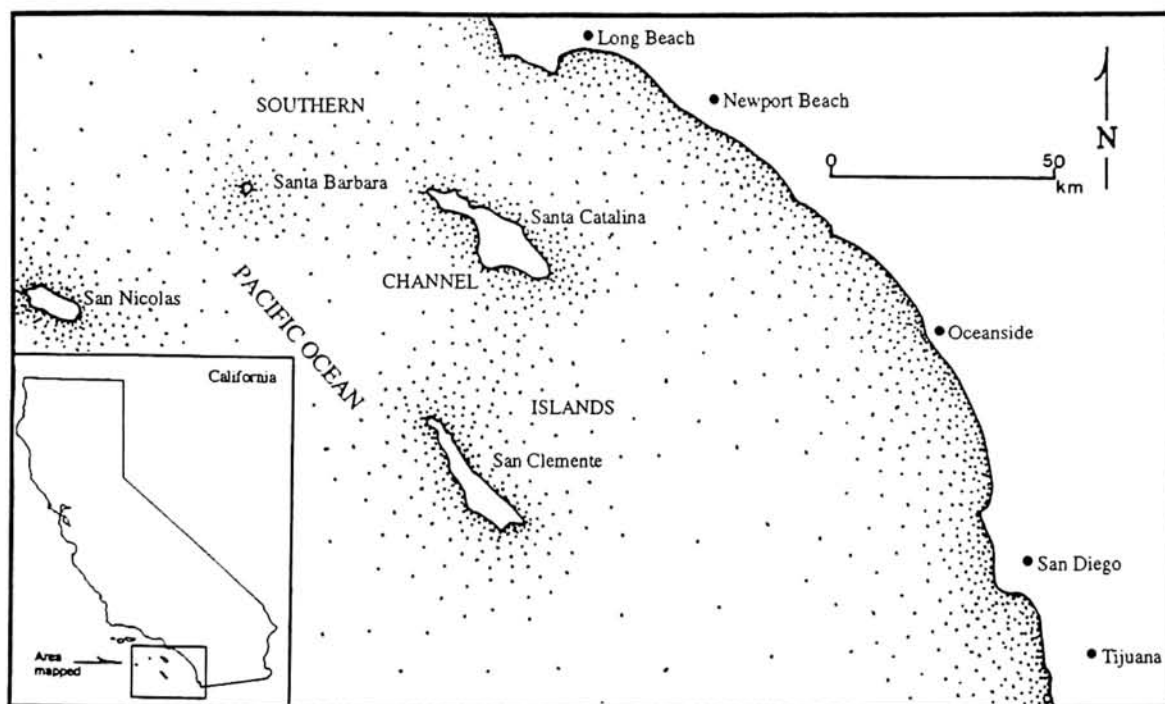


Fig. 1. Location of San Nicolas Island and San Clemente Island.

and their amino acid compositions determined by ion exchange liquid chromatography (HPLC). Specimens SN-14 and SN-Misc exhibited extremely low nitrogen values (below 0.1%) and their amino acid compositions did not resemble that of collagen. In contrast, Specimen SN-10 contained 2.7% nitrogen and 10.8% carbon by weight, and its amino acid profile indicated the presence of collagen. Since the amount of nitrogen in a sample is proportional to the amino acid content, low nitrogen values indicate that very little organic material is present for analysis. A "non-collagen-like" amino acid profile suggests that the original organic content of the bone has been subject to various diagenetic effects and may not provide a reliable age determination. Thus, it was decided that only Specimen SN-10 contained sufficient collagen for a reliable radiocarbon age.

TARGET PREPARATION AND ANALYSIS

A 194-mg. sample from Specimen SN-10 (UCR Laboratory No. 2456) was hydrolyzed in

6N hydrochloric acid and a total amino acid fraction extracted through ion exchange chromatography. The total amino acid fraction was combusted to CO_2 in a sealed VYCOR tube at 900°C for three hours. After collection and purification, an aliquot of the CO_2 was reserved for stable isotope analysis ($\delta^{13}\text{C}$), and the rest was converted to graphite under hydrogen using a cobalt catalyst in a method described by Vogel et al. (1987a). When the reaction was complete, the graphite powder was tamped into an aluminum target holder and sent to the Center for Accelerator Mass Spectrometry at the University of California Lawrence Livermore National Laboratory (LLNL) for counting (CAMS No. 12349). Details of the operation of the accelerator at LLNL may be found in Vogel et al. (1987a, 1987b).

RESULTS AND DISCUSSION

Because collagen tests indicated virtually no residual collagen for Specimens SN-14 (Fig. 2c) and SN-Misc (Fig. 2d) and minimal residual colla-

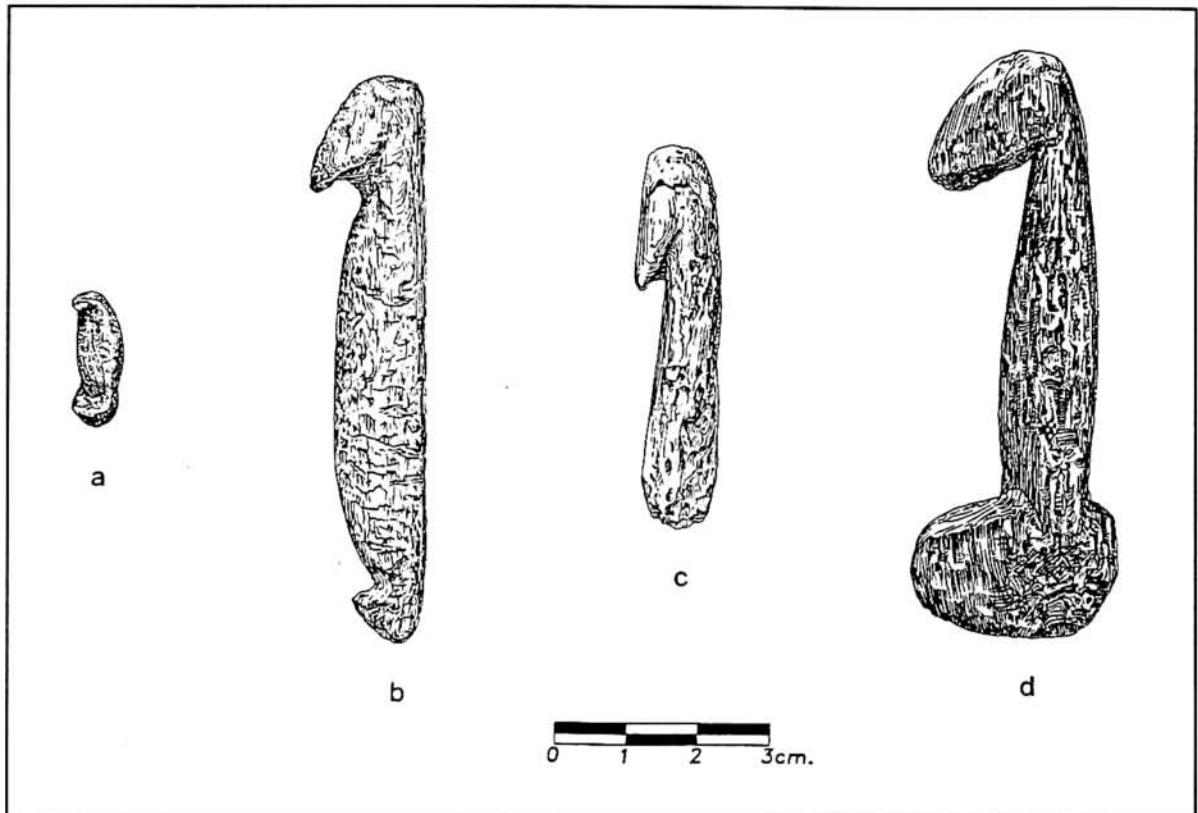


Fig. 2. Bird/hook stones: (a) Specimen SDM 6069, tooth, San Clemente Island; (b) Specimen SN-10, marine mammal bone, San Nicolas Island; (c) Specimen SN-14, marine mammal bone, San Nicolas Island; (d) Specimen SN-Misc, marine mammal bone, San Nicolas Island.

gen for Specimen SN-10 (Fig. 2b), the authors anticipated the possibility of a pre-Late Prehistoric Period date. AMS analysis yielded a determination of $3,480 \pm 60$ RCYBP (UCR-2456/CAMS No. 12349). This conventional date is adjusted for a $\delta^{13}\text{C}$ measurement of $-16.10/00$. The calibrated age at one sigma is 1,882 B.C. to 1,733 B.C.

It is conceivable that the genre occurred as early as around the Middle/Late Holocene interface and endured for three millennia, but there is no independent evidence to support a continuity between such antiquity for bird/hook stones and the relatively late steatite examples. Speculatively, bird/hook stones may have been carved of comparatively nondurable material, particularly wood, over a possibly long period of time for the artifact type. Lee (1981:48) has listed wood and yellow ochre as among the materials for manufacture of

these effigies.

It is also possible that Late Prehistoric artisans on San Nicolas Island collected old marine mammal bone to carve bird/hook stones. If so, this study provides a cautionary note, adding to the list of examples for which the date of the sample material is unrelated to a cultural event. For example, one "pelican effigy" in the collections of the Santa Barbara Museum of Natural History appears to be manufactured from fossil whalebone (Hudson and Blackburn 1980:181). It seems that this study has introduced more questions than it has answered.

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REFERENCES

- Abbott, C. C.
1879 Miscellaneous Objects Made of Stone. In: Report Upon United States Geographical Surveys West of the One Hundredth Meridian VII:190-217. Washington: Government Printing Office.
- Cameron, Constance
1983 Birdstones of Orange County. *The Masterkey* 57(2):63-72.
1988 Birdstones and Their Associations. *Pacific Coast Archaeological Society Quarterly* 24(4):54-62.
- de Cessac, Leon
1951 Observations of the Sculpted Stone Fetishes in Animal Form Discovered on San Nicolas Island (California). Berkeley: University of California Archaeological Survey Reports No. 12:1-5.
- Gifford, E. W.
1940 California Bone Artifacts. *University of California Anthropological Records* 3(2).
- Grant, Campbell
1978 Eastern Coastal Chumash. In: *Handbook of North American Indians*, Vol. 8, California, Robert F. Heizer, ed., pp. 509-519. Washington: Smithsonian Institution.
- Harrington, John P.
1942 Culture Element Distributions: XIX: Central California Coast. *University of California Anthropological Records* 7(1).
- Hoover, Robert L.
1974a Some Observations on Chumash Prehistoric Stone Effigies. *The Journal of California Anthropology* 1(1):33-40.
1974b An Unusual Stone Effigy from Southern California. *The Masterkey* 48(1):32-34.
- Hudson, Travis, and Thomas C. Blackburn
1980 The Material Culture of the Chumash Interaction Sphere, Vol. IV: Ceremonial Paraphernalia, Games, and Amusements. Menlo Park: Ballena Press Anthropological Papers No. 30.
- Koerper, Henry C., and Armand J. Labbé
1987 A Birdstone from San Diego County, California: A Possible Example of Dimorphic Sexual Symbolism in Luiseño Iconography. *Journal of California and Great Basin Anthropology* 9(1):110-120.
1989 "Libidinal Symbolism," Etcetera. . . Rejoinder to Cameron (1988). *Pacific Coast Archaeological Society Quarterly* 25(3):46-52.
- Lee, Georgia
1981 The Portable Cosmos: Effigies, Ornaments, and Incised Stone from the Chumash Area. Socorro: Ballena Press Anthropological Papers No. 21.
1993 Fake Effigies from the Southern California Coast? Robert Heizer and the Effigy Controversy. *Journal of California and Great Basin Anthropology* 15(2):195-215.
- Rozaire, Charles E.
1958 Preliminary Report on Excavations at Chilao Flats. *Archaeological Survey Association Newsletter* 5(2):13-14.
- Vogel, John S., D. E. Nelson, and John R. Southon
1987a ¹⁴C Background Levels in an Accelerator Mass Spectrometry System. *Radiocarbon* 29(3):323-333.
- Vogel, John S., John R. Southon, and D. E. Nelson
1987b Catalyst and Binder Effects in the Use of Filamentous Graphite for AMS. *Nuclear Instruments and Methods B29*:50-56.
- Wallace, William J.
1987 A Remarkable Group of Carved Stone Objects from Pacific Palisades. *Pacific Coast Archaeological Society Quarterly* 23(1):47-58.
- Yates, Lorenzo G.
1889 Charm Stones: Notes on the So-Called "Plummets" or "Sinkers." Washington: Smithsonian Institution Annual Report for 1886, Pt. 1, pp. 296-305.

