# Astragalus Bones: Artifacts Or Ecofacts?

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**Abstract**

Ethnographic and historic sources document wide cross-cultural employment of astragalus bones in amusements, games, and divination practice. This study includes an abridged record of astragalus use in Native California. Astragalus bones as artifacts generally receive sparse mention in site reports from coastal southern California. There are, however, archaeological data, albeit limited, that indicate a high ratio of astragali to other foot bone elements, a reflection, we believe, of association with activities beyond mere food consumption. We maintain that many astragali are sorted into ecofactual collections when they may have served as gaming pieces. This cautionary tale describes several specimens with evidence of use wear as might have occurred had the artifacts been rolled like dice.

## Introduction

"Superstructure," a concept of cultural studies, includes "behavior and thought devoted to artistic, playful, religious and intellectual endeavors" (Harris 1995:19). Material manifestations of religion, aesthetics, play, and other aspects of superstructure, their presence or absence, can help characterize site function in local archaeology (e.g., Koerper 1981; de Barros and Koerper 1990). Settlements with ceremonial caches, burials, and gaming or divination pieces are unlikely to be mistaken for mere mollusc shucking stations. Rather, when there are interpretive challenges, they focus more often on whether particular excavated items were actually linked to behavior and thought associated with a society's superstructure.

The morphology of artifacts deriving from the more ideational or mentalistic aspects of culture are generally less revealing of their former purposes than are the more mundane artifacts, such as projectile points, manos, and metates. Especially problematic are natural items, organic and mineral, with little if any modification or apparent use wear, possibly collected and kept as curiosities, as talismans/magical objects (Boscana 1933:38; Duflot de Mofras 1937:I:191; Kroeber 1908:15; Longinos Martínez 1961:60; Hoffman 1885:31; Iovin 1963:115), or as game pieces. For example, how many local ecofactual collections contain raptor talons once possessed by shamans, or, another case in point, and the subject of this cautionary tale, how often do deer astragali (Fig. 1), or talus bones, go unrecognized as items once employed for recreation?

## The Ethnographic and Archaeological Record

Ethnographic literature for the Far West sporadically records the use of astragalus bones in "recreational activities," a category of behavior, which for purposes of cross-cultural research

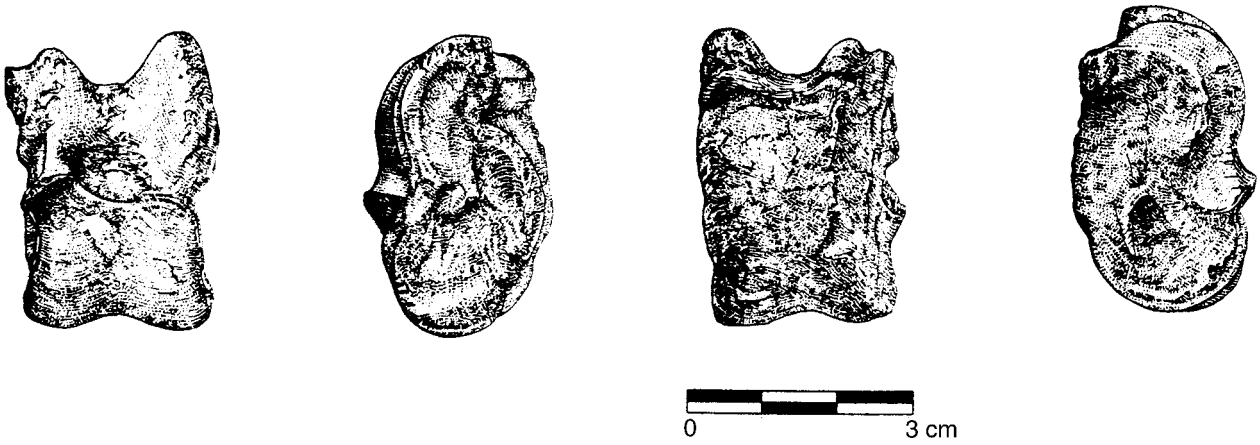


Fig. 1. Astragalus bone with use wear from CA-ORA-83. Found by Herrold Plante; curated at the Mission San Juan Capistrano Museum. Shown actual size.

separates into “games” and “amusements” (Roberts et al. 1959:597). Roberts, Arth, and Bush (1959:597) define games as organized play in which two or more sides compete following agreed upon winners and losers. In contrast, amusements include such pastimes as spinning tops, forming cat’s cradles, or twirling buzzes. Depending on circumstances, play with ring-and-pin might be enjoyed either as a game or as an amusement (see Culin 1907:527-561).

In the Great Basin, Utes and Southern Paiutes made deer ankle bones into buzzes (Stewart 1942:292), a kind of whirling toy, or whirligig, a trait shared with Plains tribes (Culin 1907:751). Deer carpals used as buzzes are also recorded for the Klamath, Shasta, and Achomawi (Voegelin 1942:101), and thus we speculate that astragali may also have been used. E. W. Gifford in his 1940 corpus on *California Bone Artifacts* describes two astragalus artifacts, one a deer astragalus and the other elk. Both pieces are categorized as perforated, spool-like objects (Gifford 1940:179, 226, [CCI]) and were found in the San Francisco Bay region, near Berkeley. Gifford postulated that these were elements of ring-and-pin games, since two Wailaki (Mendocino County) examples of the game exhibit 18 and 19 astragalus bones, respectively, strung on buckskin with an attached pointed stick (Gifford 1940:179; see also Elsasser 1978:201-202). Harrington has left specific details of a cow or sheep astragalus as a gaming piece in a Chumash version of “knucklebone jack,” or “tabita” (Hudson and Blackburn 1986:374-375; Hudson and Timbrook 1997:18). Undoubtedly, a deer knucklebone was used in the precontact period.

Owens Valley Paiute had footbone dice (Driver 1937:83). In the Southwest, Papagos used a bison astragalus as a die in a game known as “tanwan” (Culin 1907:148). Astragali as dice appear in the California culture area, at least among the Yokuts (Driver 1937:83), possibly the Maidu (see Voegelin 1942:100), Pomo (Culin 1907:135), Salinan and Chumash (Harrington 1942:27), Gabrielino (Harrington 1942:27; Blackburn 1963:21; McCawley 1996:183), and

Luiseño (Drucker 1937:24). Gunner Meyers' last century watercolor sketch (Fig. 2) shows California Indians gambling with what appear to be astragalus bones (see also Camp 1966:illustration opposite title page).

Fig. 2. Nineteenth century watercolor sketch of California Indians gambling by Gunner William H. Meyers. Courtesy, Bancroft Library, University of California, Berkeley.

The local archaeological literature rarely recognizes an association of astragalus bones with gaming activities. Meighan (1959:32), however, reported an unmodified astragalus in an infant cremation from Cougar Canyon (Borrego area), San Diego County, noting that recent Indians gambled with these bones. The gaming association has also been made for finds at CA-SDI-5353 (Koerper et al. 1992:25), CA-ORA-855 (*Putuidem*) (Koerper et al. 1988:246), and CA-ORA-378 (Christ College site) (Koerper 1995:6-238).

Catherine Martin mentioned astragali as dice in an article that included a formal analysis of deer remains at three Los Angeles County sites and one Ventura County site (1972:155). Particularly noteworthy was her observation that deer astragali were recovered from the excavations in quantities out of proportion to the other foot bone elements (Table 1). The collective ratio of astragalus to calcaneus (or heel) elements at the four sites was 2.38 to 1, rather than the expected 1 to 1 ratio. Further, the ratio of the combined carpals and tarsals (calcaneus excluded) to astragali from CA-LAN-167, -243v, and -246 and CA-VEN-39 sites was 3.05 to 1 (Martin 1972:170), yet the ratio in the animal is 9 to 1. A similar study was

conducted on deer foot bones from five sites in Orange County surrounding Bolsa Bay: ORA-82, -83, -85, -88, -365 (Table 1). As with the Martin (1972) study, the ratio of astragalus to calcaneum elements was over 2 to 1; the ratio of astragalus bones to the combined carpal and tarsal (calcaneus excluded) count calculated at 2.58 to 1. Again, the results show that an abnormal number of astragalus bones were recovered relative to the other elements of the foot of the deer. Over half of the astragalus bones (7 out of 12) were collected from ORA-83, the Cogged Stone Site. The provenience of these finds suggests dates older than 4,000 years B.P. (Whitney-Desautels 1995). The ORA-365 example and two astragali from ORA-82 were located in Intermediate Horizon levels; the two examples from ORA-88 were located in the upper two levels of the site which date to the Late Prehistoric period (Whitney-Desautels 1994).

Table 1. Deer Bone Fragments from Nine Southern California Sites.

| Site | Calcaneus | Astragalus | Carpals/Tarsals |
|---|---|---|---|
| LAN-167* | 2 | 6 | 7 |
| LAN-246* | 1 | 3 | 15 |
| LAN-243* | 2 | 2 | 6 |
| VEN-39* | 3 | 8 | 30 |
| Totals | 8 | 19 | 58 |
| Ratio of Calcaneus to Astragalus | | 1:2.38 | |
| Ratio of Astragalus to Carpals/Tarsals | | | 1:3.05 |
| ORA-83** | 3 | 7 | 11 |
| ORA-85 | | | 3 |
| ORA-82 | 2 | 2 | 11 |
| ORA-88 | | 2 | 3 |
| ORA-365 | | 1 | 3 |
| Totals | 5 | 12 | 31 |
| Ratio of Calcaneus to Astragalus | | 1:2.40 | |
| Ratio of Astragalus to Carpals/Tarsals | | | 1:2.58 |

* Martin (1972:170); ** ORA-83 includes H. Plante's surface find

The deer astragalus (Fig.1) collected by Herrold Plante from the Bolsa Chica area is an artifactual rather than an ecofactual item. It clearly shows some use wear. Two other specimens exhibit some wear (Fig. 3).

Fig. 3. Astragalus bones from CA-ORA-83: 3a is on the left.

## Description

Herrold Plante found the first astragalus (Fig. 1) from the surface at ORA-83. This artifact has since been donated to the Mission San Juan Capistrano Museum. Paul Langenwalter (personal communication 1997) identified the specimen as an element of the hind limb of a Black-tailed deer (*Odocoileus hemionus*). It weighs 17 grams. The length is 39.2 mm, the width measures 26.3 mm, and maximum height is 24.8 mm. There is evidence that the piece received some heat treatment, possibly to harden the bone.

The second and third astragali with use wear are also both *Odocoileus hemionus* pieces which were unearthed during recent excavations on ORA-83 (Whitney-Desautels 1995). The larger of the two (Fig. 3a) weighs 16.1 grams, is 35 mm in length and 22mm in width, and has a maximum height of 17 mm. The third astragalus (Fig. 3b), though smaller than the other two examples, is also from an adult animal. This piece is 29 mm long, 20 mm wide, 15 mm high, and weighs 7.9 grams.

Significantly, high points along the surfaces of the Plante specimen (Fig. 1) show a combination of slight polish and light crushing, wear that might be expected of a die that once tumbled over a dirt landing area. The lightly abraded surfaces indicate the operation of kinetic forces beyond what we would expect from the tumbling of an astragalus merely stored and transported in a leather bag as, say, a talisman or other magico-religious item. Use wear on the specimens (Fig. 3) is minimal enough to be accounted for by transport in, say, a leather bag.

## Discussion

Cross-culturally, astragali as artifacts are normally associated with amusements, games, and divinatory practice. Rare employment of astragali outside of society's superstructural component includes, for example, Siberian Chuckchee use of a reindeer astragalus as the upper piece to steady a fire-drill shaft (Bogoras 1904:231-232), a function made possible by a rounded depression found within one of the four sides of an astragalus. Copper Eskimo used caribou astragali for "mouthpieces" in drilling sets (Jenness 1946:101-102). The special morphology of the bone, however, is ever more significant to other purposes.

Astragali have four distinct sides, are often of convenient size for the human hand, and will roll easily on flat surfaces, all attributes which promote use of the bone in contexts embracing chance (viz., as dice for both gambling games and for divination). Gambling and efforts to foretell events further connect from the belief of many peoples that supernatural forces are determinants of luck in gambling (c.f. Roberts et al. 1959).

Astragalus bones are kept as dice by cultures worldwide. For instance, ancient Babylonians and Egyptians (Gabriel 1996:161), the Aymara on the Lake Titicaca Plateau (La Barre 1948), the Tarahumara of Mexico (Lumholtz 1902:I, 278; Pennington 1963:236; Bennett and Zingg 1935:345), some Indians of Costa Rica (Lovett 1901:283) the Tlingit of the Northwest Coast culture area (Emmons:n.d.), and the Lozi of Zambia (Prins 1980:129) all employed astragali for dice. Lovett (1901) lists a wide variety of peoples who used astragalus bones as dice and/or jacks, including the Turks, Arabs, Persians, Asian subcontinent Indians, Native Americans of the Southeast, and western Europeans. The Flemish artist Peter Breughel (1528-1569) painted into his masterpiece, "Children Games," two women using sixteen astragali competing at knucklebones. Similar games employing astragalus bones (some fashioned of metal, plastic or other materials) have survived in western tradition into relatively recent times, in Belgium, Holland, France, Italy, the British Isles, Australia, and Tasmania (Lovett 1901; Howard 1958; David 1962:3). Further, astragalus (talus) bones were used as jacks, game dice, and divination dice in the Classical world (e.g., Gabriel 1996:160-161, 229-230), where representations of the astragalus appear in ceramic art (Richter 1946:73, 111, Fig. 79) and circulated on Greek (Fig. 4a) and Roman coinage. Parenthetically, the numismatic heraldic device depicted in Figure 4b, a young woman casting several astragali, serves as a pun to identify the origin of the coin, Tarsus Cilicae, in Asia Minor.

Had a similar artistic expression reflecting use of the astragalus bones survived in southern California, local archaeologists would certainly not overlook the artifact as indicator of gaming and/or divination, and the implications of such artifacts for characterization of site function. A survey of site report literature from the *PCAS Quarterly* reveals no mention of astragalus bones as possible artifacts, save for the aforementioned example from SDI-5353 (Koerper et al. 1992). The presumption here is that astragali are often sorted into ecofactual collections when many, perhaps the majority, had actually served as gaming pieces.

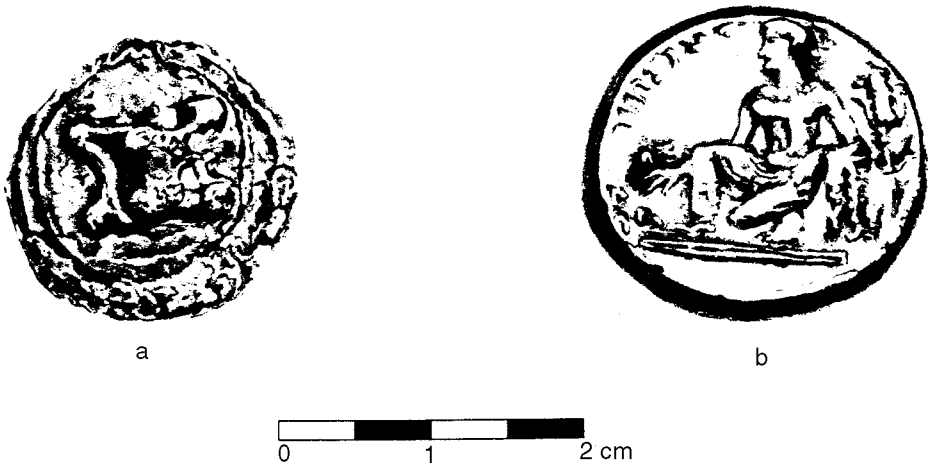


Fig. 4. Astragali depicted on Greek coinage; a) Didrachm from Athens, sixth century B.C. Weight, 8.42 grams. b) Silver stater from Tarsus Cilicae depicting young woman casting astragali, early fourth century B.C. Weight, 10.00 grams.

We offer some final thoughts. A search through regional faunal collections to document astragali, noting any modifications, by design or use, and documentation by ratio calculation against other skeletal elements, might conceivably provide interesting research information and lead to a master's thesis. In addition, caution is urged if counts of deer astragali are part of MNI (minimum number of individuals) estimates. Such estimates are used to calculate contributions of animals, including deer, to subsistence fare (see Klippel and Morey 1986:807; also Emerson 1978). As has been demonstrated, however, abnormally high quantities of deer astragali are noted from sites in Ventura, Los Angeles, and Orange counties which would artificially inflate the presence of deer in the diet if this bone element was used for diet reconstruction. Further, it is suggested that future research examine all deer tarsal and carpal bones carefully and particularly note and separate all astragali. In this way, accurate reporting of the probability of play activities at a site is possible, thereby contributing to identification of at least one activity which would, in turn, add to understanding the superstructural component of a site.

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