PRELIMINARY ANALYSIS OF FAUNAL REMAINS FROM MISSION PERIOD FEATURES AT SANTA CLARA

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Several Mission-period features, including a house floor, pits, and a large butchering feature, were excavated at Santa Clara in the fall of 2005 and spring of 2006. Much of the archaeological assemblage was composed of faunal remains, primarily of cattle. Preliminary descriptive analysis of these remains has occurred. This analysis focuses on an overview of cattle butchering techniques and identification of cuts. Other domestic and wild animals were also identified from the remains.

Allen and Blount (2009) describe the excavation and findings of a Native American house floor and a series of what are presumed to be storage pits. A preliminary faunal analysis was performed on the non-fish vertebrate faunal assemblage from these features. The analysis focused on materials from deposits and strata known to date to the Mission period. Altogether, the entire faunal assemblage from the excavated Mission contexts numbers approximately 8,210 separate pieces of bone. The vast majority of these are non-identifiable bone fragments that could be identified only as undifferentiated mammal or assigned to the vertebrate sub-phylum. In general, this category included bone that was so highly fragmented and/or burned that it was past the point of recognition except at those general taxonomic levels.

A portion of the assemblage – 1,529 bones or nearly 20 percent – was identified to more precise taxonomic categories, predominantly domestic cow (*Bos taurus*), sheep/goat (*Ovis/Capra*), lagomorphs (rabbits/hares), and rodents. The total bird assemblage, including identifiable and non-identifiable elements, consists of 344 pieces of bone. About 10 percent of this assemblage was identified to more precise categories.

METHODS

In the field, archaeologists processed all soil through either 1/8-in. dry-screens or 1/16-in. wet-screens. All excavated matrix from known Mission-period features and strata was wet-screened through 1/16-in. mesh, and the constituents sorted into gross categories. This resulted in the recovery of numerous small mammal, bird, and fish bones. The latter were sent to a specialist (Peter Schulz, California Department of Parks and Recreation), and are not reported on here.

In the laboratory, researchers sorted the bone by skeletal element into taxonomic categories; determined side; and counted, weighed, and examined all bone for evidence of butchering and burning. Following standard procedure, each bone was identified to the lowest taxonomic category possible using comparative material from three sources: the California Department of Parks and Recreation Archaeology Lab in West Sacramento; the Archaeology Research Lab at Santa Clara University; and the Zooarchaeology Laboratory at the University of California, Santa Cruz. When more precise identification was not possible, the bone was assigned to size categories, consisting of large, medium, and small. For the mammals, the "large" category consisted of cow-sized and larger bones, the "medium" category sheep-sized bones, and the "small" category smaller-than-sheep bones. There was also a rodent category, indicating activity intrusive into the archaeological record.

PRELIMINARY RESULTS

Cow (*Bos taurus*)

Remains of cattle clearly dominate the identified assemblage in terms of raw bone count, accounting for 33 percent. This is the highest percentage of any taxonomic category (excluding, of course, the undifferentiated mammal bone). When the large-mammal bone, the majority of which is assumed to be cow, is combined with the cow category – the percentage rises to 50 percent. Further, if we eliminate the rodent category from the identified assemblage, the cow bones account for approximately 62 percent of the assemblage.

A total of 23 separate skeletal elements – ranging from limb bones and ribs to vertebrae and toe/finger bones – was identified as belonging to cow. The general condition of the cow bones can best be described as heavily fragmented. Butchering has resulted in the breakage of most limb bones, sections of ribs, and fragmentation of skulls. Only smaller bones – such as carpals, tarsals, phalanxes, caudal vertebrae – were intact. The single most dominant skeletal element is cow rib – it accounts for 26 percent of the cow assemblage, followed in decreasing order by vertebrae (14 percent), phalanx (13 percent), and teeth (about 10 percent). If all of the different limb elements are classified as a single category – e.g. femurs, humerii, radii, and ulna – they account for 27 percent of the assemblage – slightly higher than that the percentage of rib. Considering all this, it is clear that limb and rib elements are the most common bones in the assemblage. When limb bones are divided into two categories – hindlimbs and forelimbs – the forelimbs are more common than the hindlimbs, although the difference between these two categories is not remarkable: there are 63 forelimb elements as opposed to 43 hindlimb elements. The primary difference is in the number of carpals.

There are three types of butchering marks evident on the cow bone: cut marks (presumably made by a metal knife), hack marks (probably made from an axe), and a technique known as spiral fracturing. No saw marks were found in the collection. The knife cut marks are characteristically shallow grooves less than 1 mm in diameter, while the hack marks are deeper grooves that typically are more than 1 mm in diameter. Many of the limb, vertebra, and rib elements exhibit both cut and hack marks. Knives and axes were the main instruments used during the Spanish and Mexican periods for butchering cattle. Gust (1981) has described this pattern as one whereby butchers used axes to divide the carcass, then used knives to cut through tendons and muscle in order to strip the meat off the bones.

The third type of butchering pattern seen in the cattle assemblage is a break consistent with spiral fracturing. This is evident on the shafts of most of the larger limb bones, indicating that the bones have been fractured and the shaft is splintered, while the two ends remain partially intact (Figure 1). Of the entire cattle limb assemblage, only eight specimens are wholly intact, complete pieces. The vast majority, nearly 90 percent, have broken shafts, so that either the proximal or distal end is identifiable, but not both. Spiral fracturing is typically produced by a two-step method involving first a high velocity percussion impact, followed by a manual twisting of the bone to further break the shaft. This can perhaps best be described as a "smash and twist" method. Characteristic marks left behind on the bone from this type of fracturing include a cone at the point of impact, negative scars surrounding the point of impact, and radial cracks that spiral around the bone longitudinally. Almost all of the cattle limb bones, especially the humerii and femurs, exhibit these types of breakage patterns. Accompanying this is a sizeable percentage of the undifferentiated large mammal category, which is comprised of longitudinal pieces with sharply pointed ends.

Sheep/Goat (*Ovis/Capra*)

Only 20 elements could be identified as belonging to the sheep/goat category, representing less than 1 percent of the identified assemblage. Of these, 12 elements were positively identified as sheep (*Ovis* spp.), while the remainder could not be distinguished between these two taxa, and were classified simply as sheep/goat. The majority of sheep/goat bone consisted of vertebrae (six pieces) and phalanxes (also six pieces). Five sheep/goat limbs were also recovered; unlike the cow limbs, the majority of these are complete.

Figure 1. Cow limb showing evidence of spiral fracturing.

Only one element, an ulna, is broken. Very few butchering marks on the sheep/goat bones, aside from a few knife cut marks, are discernable.

Secondary Mammals

The remaining identified mammals include canid (2), horse (1), mule deer (1), lagomorph (10), undifferentiated artiodactyl (6), and rodent. This latter category is quite sizeable and totals 229 bones, or approximately 15 percent of the entire identified assemblage. Identified species among the rodent bones include ground squirrel, pocket gopher, mouse, deer mouse, and wood rat. While it is known that some of these creatures, such as the ground squirrel, were sometimes eaten by nineteenth-century Californians, it is likely that rodents did not play much a role – if any at all – in the diet of the Mission inhabitants, and these bones were probably intrusive in the deposit, the result of natural animal activity within the area excavated.

Bird

Analysis of bird bone is still in progress; to date 344 pieces of bone have been identified as belonging to bird. So far, only about 10 percent of this assemblage has been identified to more precise taxonomic categories. Identified species include chicken, turkey, quail, and heron, with chicken predominating. At this time, it is not known if the turkey bones are from domestic or wild forms. There are also numerous passerine forms (which include perching birds and songbirds) – but these have not yet been identified to species.

FINDINGS

As is typical of Mission-period sites in California, the remains of cattle are more abundant than those of any other animal in the Mission Santa Clara material, and cows appear to have been a major source of meat. Research at other missions in California (as well as elsewhere, such as Spanish colonial Florida) indicates a pattern of heavy reliance on domestic animals, especially cattle. The relative paucity of animals other than cow at Mission Santa Clara is interesting; but perhaps given that the features relate to neophyte occupation areas (as the house floor seems to suggest), it is not all surprising. In fact, it follows a pattern seen elsewhere. For example, at Mission San Buenaventura, researchers estimated that beef accounted for between 80 and 90% of the meat diet of neophytes (Romani and Toren 1975). The same large percentage of cattle remains in neophyte-associated trash areas was found at Mission San Antonio (Langenwalter and McKee 1985). Similarly, at Missions Santa Cruz (Walth 1990) and San Juan Bautista (Farris 1991), cattle remains dominated assemblages associated with neophyte residences.

The other interesting insight from the faunal assemblage is the spiral fracturing on the shafts of the cattle longbones. As the faunal remains relate to neophyte-associated areas, then what the assemblage is indicating is evidence of a continuation of a prehistoric Native Californian pattern of bone processing, the "smash and twist" method, applied to Spanish domestic cattle. This method was a fairly common technique among prehistoric Native Americans, and among modern hunter-gatherers worldwide, for the purpose of marrow extraction. The neophytes may have used any number of objects – stones, pestles, the blunt end of an axe, etc. – to smash the shafts and get at the marrow.

The implication then is that at least some traditional Native American butchering practices survived missionization, especially with regard to the processing of limb bones of large mammals. Assuming that the house floor was occupied by recent arrivals into Mission Santa Clara (Allen and Blount, this volume), it is likely that these neophytes continued their traditional patterns. However, the longer the neophytes remained at the mission and were subsequently exposed to Spanish lifeways, it is possible that they may have had access to more European-style tools, and adopted more Hispanic butchering techniques. At Mission Santa Cruz, for example, with a longer period of neophyte occupation, Hispanic butchering marks were evident throughout the assemblage (Allen 1998:57), and more closely resembled butchering patterns from features associated with missionary residence (Walker and Davidson 1989).

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