DECODING THE BONES
Spanish Colonial Butchering Practices at the Royal Presidio of Monterey

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Introduction[1]

The Presidio Reál de San Carlos de Monterey was the commanding military institution of the *Californias* from circa 1770 through 1840. Significant Spanish colonial era architectural, material cultural, and faunal remains were recovered during the course of archaeological field investigations undertaken between 2006 and 2008 by Dr. Ruben Mendoza and the field crews of the California State University, Monterey Bay. Faunal remains, particularly those of Bos taurus, Sus scrofa, Ovis aries, Capra a. hircus, and Gallus gallus (from herein referred to as cow or cattle, pig, sheep, and chicken) were recovered in significant quantities. Given the value of faunal remains for assessing butchery practices, and thereby dietary preferences in human populations, this paper examines those cultural modifications or cutmark and consumption patterns in evidence from the collections in question. In order to properly assess the value of said collections, an experimental archaeology was undertaken in order to attempt replication of those cutmarks noted from the collections of the Royal Presidio of Monterey for the purposes of identifying both butchering patterns and dietary preferences. The investigation of faunal assemblages from other Alta California Spanish colonial and Mission era (circa 1769-1834) sites are in turn reviewed for their implications at the Royal Presidio of Monterey.

The experimental archaeology undertaken for this review sought to simulate butchery patterns and modifications observed on the faunal remains from the Royal Presidio collection. Essential to this experiment were fresh cuts of beef and pork with the skeletal elements intact, including that of a rib rack and, sections of a limb or shank. It should be noted that those specimens utilized constitute relatively accurate examples of food sources

About the Author
Jennifer Lucido, BA, is a graduate of the California State University, Monterey Bay, with a Bachelor of Arts degree in Social and Behavioral Sciences. Specializing in California archaeology and Mission era life ways of the Monterey Bay, she is presently a graduate student in the Cultural Resources Management at Sonoma State University, and continues her studies into the archaeology of the missions and sole presidio of the Monterey Bay. Ms. Lucido's extensive field experience includes Missions San Juan Bautista and Soledad, as well as her efforts with the Society for California Archaeology's coastal survey of Marin County. She continues her analyses of collections from the Royal Presidio of Monterey for her Master's thesis.
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Most recently Jennifer served as a Program Coordinator for the National Endowment for the Humanities Landmarks of American History and Culture Workshops for School Teachers (http://the14thcolony.org/): *The Fourteenth Colony: Native Californians, Missions, Presidios, and Colonists on the Spanish Frontier, 1769–1848.* These two one-week workshops served 80 school teachers from across the United States to explore the architectural, archaeological, cultural, and historical record of Spanish colonial missions in California.

for the presidial soldiers and Native Californian laborers at the Presidio of Monterey, as determined from those faunal elements examinedfor this study. John Grafton, who specializes in Spanish colonial ironwork techniques and traditions, recreated Spanish Colonial era metal tools, including knives/cleavers, machetes, saws, axes, and other tools utilized in this study.

Archaeology of the Royal Presidio of Monterey

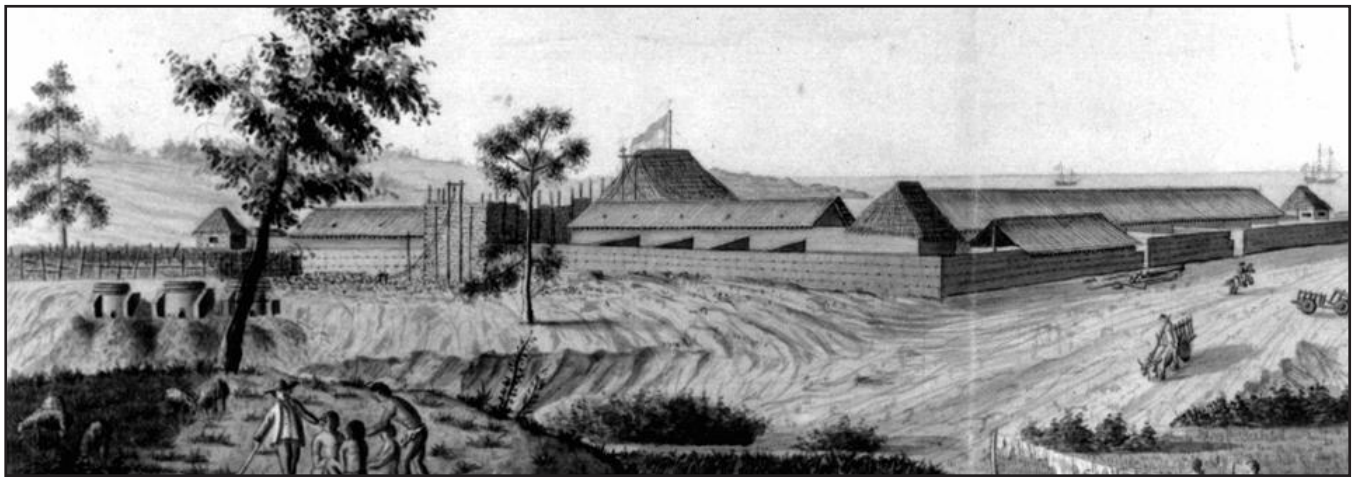


Figure 1. Jose Cardero illustration of the Royal Presidio of Monterey during the course of the 1791 construction that culminated with the completion of the Royal Presidio Chapel of 1794. Image courtesy Archives of the Diocese of Monterey and Ruben G. Mendoza.

In a recent report titled *Archaeology of the Royal Presidio Chapel: An Archaeological Resources Assessment of the Presidio Reál de San Carlos de Monterey, CA-MNT-271H, Monterey County, CA*, Ruben G. Mendoza (2009a, 2012) documents a five-phase investigation and assessment of those cultural and historical resources recovered from the Royal Presidio of Monterey during the course of a 2006 through 2008 field study. Phases 1 and 2 of the project so noted entailed the sounding of excavation units, potholes, and ultimately, trenching undertaken in 2006 and 2007. The broader effort ultimately entailed an extensive trenching operation that subsumed a total of thirty-one 22' trench spans that encircled the perimeter of the Royal Presidio Chapel during the Phase 3 operations undertaken in 2007 (Mendoza 2012).

Phase 4 of the archaeological investigation was begun in 2008, and centered on the excavation and mitigation of the Serra Chapel of 1772 (Mendoza 2009a, 2012). Significant Spanish colonial era architectural features were discovered and identified, including (a) the Terrace 1 feature identified with the original south wall of the Chapel of 1794; (b) the Serra Mission chapel of 1772; (c) the foundations of the 1778-79 Padres' Quarters; (d) foundation footings of the Sacristy of 1778; (e) foundations footings for the Baptistery of 1810; (f) foundation footings for the 1778 southern defensive curtain, which also served as the south wall of the Soldiers' Barracks and Padres' Quarters; and finally, (g) the decomposed granite and timber

footings and middens of the Chapel of 1770. The latter are thought by Mendoza to constitute the first Presidio structure erected at the site (2009a, 2012). In addition, during the course of archaeological monitoring of the site,

a rich and diverse material culture (best exemplified by a host of foreign earthenwares and *majolicas*) and great quantities of faunal remains were recovered (Mendoza 2012).

Twhe faunal remains excavated from the Terrace 1 archaeological feature have since been correlated with an 1808 midden (Mendoza 2012). The chronological assignment of said deposit was determined from a single date-stamped British shard, as well as from associated *Tlaquepaque* and other *majolica* earthenwares. According to Mendoza (2012), the midden deposits in question indicate a dietary transition from that a marine presence associated with the 1770-78 settlement through to later periods in which the emphasis is with cattle and stock raising. Cattle remains were found to dominate subsequent periods as reflected in the archaeological record (Mendoza 2012). From the findings at Terrace 1, it may be inferred that the prevalence of faunal remains identified with cattle and other stock constitutes the successful introduction and establishment of the ranching industry at the Royal Presidio of Monterey (Mendoza 2012).

Figure 2. View of archaeological monitoring operation and trenching of the perimeter of the Royal Presidio Chapel that resulted in the recovery of those samples under study. Photo courtesy Ruben G. Mendoza, 2007.

In addition to the Terrace 1 feature, culturally modified faunal remains recovered from the trenching operation focused on the perimeter of the Royal Presidio Chapel of Monterey exemplify the presence of cattle within the presidial diet. As noted, the most significant quantities of cattle-related faunal remains under study were recovered from six trenches, including Trenches 3a, 6, 26, 4a-b, 9, and 8a/c. Furthermore, Trenches 3a, 4a-b, 6, and 9 constituted kitchen middens representative of the differing periods of occupation spanning 1770 through circa 1810 (Mendoza 2009a, 2012, and Personal Communication). Ultimately, archaeological recovery within the aforementioned trenches produced thousands of individual specimens, from which those examined were selected for individual analysis and comparative assessment.

Domestic Animals in the Californias

Iberian cattle were first introduced into the New World, and Alta California, by Spanish colonists whose point of departure was west Mexico, or New Spain and Baja California. Cattle introduced to New Spain were predominantly from stock of Spanish origin introduced in the 16th century. The cattle of the Californias in particular were of Andalucían stock, and therefore, medium-sized and varied in color and physical characteristics (Gust 1991). Castilian stock, by contrast, was typically larger and predominantly black, and often used in bullfights (Gust 1991). However, it should be noted that while European domesticated cattle are of a single species, that of *Bos taurus*, and consist a host of breeds (Gust 1991). When the initial *entrada* from Baja California to San Diego was undertaken, the Baja missions collectively donated some two hundred head of cattle, 46 horses, and 140 mules (Burcham 1961). Additional animals were introduced to California from other areas of New Spain over the first few years of the missionary enterprise, including 1,050 livestock (i.e., 350 cattle) from the Presidio of Tubac, Arizona (Burcham 1961).

Ranching was one of the first major industries introduced into colonial Alta California (Burcham 1961). This industry provided meat, leather, hide, tallow, and other products. Under the mission system the new livestock flourished (Burcham 1961). Projections of livestock herds suggest that between 230,000 and 400,000 head of cattle were introduced under mission control during the period spanning 1821 through 1832 (Burcham 1961; McLaughlin and Mendoza 2009). In addition to the missionary settlements proper, each mission operated at least one *rancho* off site in order to raise and supply livestock for the mission community proper (Burcham 1961; Gentilcore 1961). California pasture lands provided the bulk of that feed used for the maintenance of stock. A host of archaeological studies pertaining to Spanish colonial stock raising in the Americas indicate that faunal remains of cattle and pig were most abundant due to their adaptability to New World environments (Reitz 1992). By contrast, such studies also found that sheep constitute a lower percentage of faunal remains, and therefore were in part less adaptive to New World settings (Reitz 1992). Ultimately, success of mission livestock reflected the population sources and environments of a given region (Gentilcore 1961). Given the exponential growth of the cattle industry and its eventual dominance in Alta California, Monroy (1990: 152) asks the question: "was beef such an attractive and easily obtainable food source that the [Californian] Indian ranch hands readily adapted the cattle culture?" Whether Native Californian participation in the cattle industry was preferential or coerced, native laborers were instrumental in the perpetuation of that "cattle culture" that supported their dietary needs as represented by the archaeological record.

The introduction of cattle, pigs, goat, and sheep prompted ecological

change (Hackel 2005). By 1783, at Mission San Carlos, there was a total of 874 animals (500 cattle) of which proved overwhelming. As the numbers grew, these animals consequently overran Indian lands, fields, and villages (Jackson and Castillo 1995). However, neophytes were permitted one to two week annual *paseos* or retreats from the missions during which neophytes could collect additional foods. This was at times necessary in order to provide access to sufficient food to sustain the Mission Indian populace of any given community (Hackel 2005).[2]

Figure 3. The vaqueros or cowboys were central to the maintenance of the Spanish colonial ranching tradition in Alta California, as elsewhere from throughout the Americas. Photo courtesy the Bancroft Library, University of California, Berkeley.

The Presidio of Monterey endured similar conflicts with overgrazing and drought, thereby resulting in the relocation of stock herds to the *Pueblo de Los Angeles* in 1781 (Hackel 2005). By 1800, the Presidio controlled 1,275 cattle and over 7,000 horses (Hackel 2005: 71). In addition, the introduction of Old World plants and agriculture prompted the ecological transformation of Alta California; and this in large measure due to botanical introductions that displaced native plant communities (Hackel 2005). Ultimately, alterations of the indigenous cultural and physical landscapes permitted the establishment of new economies poised for local and global markets.

Butchering Practices in Alta California

Excavations from the Ontiveros Adobe have recovered significant faunal remains studied and analyzed by Sherri Gust (1991). During this investigation, Gust gathered primary sources to establish a portrayal of "Californio-style" meat processing and meat preferences. From these sources, Gust determined that one of the first steps entailed the removal of the *fresada*, or that portion of meat covering the ribs (Gust 1991). The consumption and transport of meat was preceded by the cutting of meat into strips about an inch in diameter, and one to three feet long. In said form, the meat was dried out into jerky or *carne seca* (dry meat) (Gust 1991). The *carne seca* could then be pulverized into a powder with a mortar and pestle, and then mixed with other spices and/or liquids to create other food dishes (Gust 1991). Among one those sources reviewed by Gust (1991), she notes a reference that a Spanish or Mexican butcher lacks butchery skills as per Western standards. Said American cited indicated that the Spanish or Mexican butcher strips meat from the bone in a fashion similar to how one would remove skin from the carcass:

> **It would seem a small affair, at first sight, to get a piece of beef of any size, but you will learn to the contrary if you go to a Spanish or Mexican butcher. He knows nothing about side pieces or plate pieces or quarters. He goes in for stripping the meat off the bones just as he does the skin, by cutting and tearing, making the whole into shreds and patches (Gust 1991:452).**

In addition, Gust addressed the types of tools utilized during the butchery process. For the Ontiveros adobe of California, the only tools associated with the cutmarks were those of a metal knife and axe. A knife cutmark was represented by kerfs, or false starts (i.e. nicks), and was sometimes used like a saw (Gust 1991). An axe cutmark was represented by kerfs, cuts, and cuts-to-breaks. Axes likely had a flared shape in the iron, with a wooden handle. It is also likely that stone tools were utilized as well (Gust 1991).

Furthermore, Gust (1991) identified an archaeological feature from the Ontiveros Adobe that likely represented a *matanza* deposit. A *matanza* constitutes the site of an annual slaughter of cattle. This typically transpired during the summer in order to acquire hides and tallow for trading purposes (Gust 1991). Gust anticipated that such a site would entail a large number of bovine skeletal elements, and that the butchery marks should evidence a singular pattern in large measure due to the fact that the cattle would have all been slaughtered for the sole purpose of acquiring hides and tallow (1991). Alternative slaughter sites, such as those serving those missions, consisted of slaughtering twenty to thirty cattle at a given *matanza* (Gust 1991).

Figure 4. Cattle bone constitute one of the largest sampling categories of archaeologically recovered specimens from the Royal Presidio of Monterey. Photo courtesy Ruben G. Mendoza, 2007.

vExcavation of *El Presidio de San Francisco* (est. 1776) began in 1993 (Blind 2004). Within the archaeological record, faunal assemblages were recovered and served the investigators of this site as a prime indicator of dietary preferences. Those faunal remains recovered clearly indicate that the soldiers and settlers sustained a meat-based diet, primarily dependent on cattle (Blind 2004). The presidio faunal collection also provided key evidence for the identification of the *Californio* style butchery pattern, akin to that drawn from the faunal assemblages of the Ontiveros Adobe. The *Californio* style also consists of marks that would have been made from straight-edged knives and cleavers

to separate the meat from the bone (Blind 2004). Significantly, the presidio excavation produced evidence for the presence of wild game animals, such as deer and rabbit. Interestingly, significant quantities of the latter were also represented, thus suggesting that the midden(s) from which the faunal remains were recovered may well correspond to subsistence activities of the native inhabitants prior to the initial settlement period *El Presidio de San Francisco* (Blind 2004).

At Rancho Petaluma, a northern California ranch establishment, principle investigator Stephen Silliman conducted archaeological excavations with the intentions of identifying residential features and material culture associated with the Native Californian laborers of that site (2004). While the investigations did not recover residential features as Silliman anticipated, he did recover a variety of material cultures indicative of native residential and domestic activity, notably that indicating the use of stone tools (obsidian, chert, ground stone, pestles, manos, mortars), glass and shell beads, culturally modified or incised bones and glass, mass-produced ceramics, nails, and other metal objects (2004). The identification of lithic tools in association with metal objects was deemed significant. Said tools may represent the limited access to or availability of Spanish colonial metalwork, thereby requiring or permitting a dependence on stone tools of the native tradition. Silliman thereby challenges existing perspectives that argue for the total abandonment of native stone technologies in the wake of the introduction of Spanish colonial tool technologies.

Additionally, stone tool evidence, significantly that of obsidian materials, are found in various colonial sites of California, including those of the Franciscan missions, Spanish and Mexican ranchos, and the Russian trade colonies. Silliman suggests that such predilections may represent a preference for such tools among the neophytes, as well as a political, social, or cultural statement about identity and/or gender (Silliman 2004: 102). Additional aspects of the archaeological assemblage encompass food remains, including faunal and plant specimens deemed essential to daily life. Silliman contends that such evidence may indicate political choices, such as those pertaining to societal distinctions between laborers and their employers (2004). Most significantly, the presence of cattle remains in the native residential areas may reflect open access to said resources.

Colonial Era Butchery Technology

The introduction of cattle to Alta California brought with it Hispanic ranching and butchery technologies. In ranching, a hocking knife, *desjarretadera* (a crescent-shaped steel blade of either concave or convex form) was mounted on a four to five-foot pole (for use while riding horseback). The hocking knife was used to sever the hamstring on cattle (Simmons and Turley 1980: 88), thereby felling the animal for slaughter (Simmons and

Turley 1980). In addition, butchered cattle were stretched with ropes onto large wooden racks and prepared for transport (St. Clair 2004). Axes were used to divide the carcass and break appendicular bones above or below the joints as well at the center or diaphysis of the bone (St. Clair 2004). Knives with wooden handles were then used to cut both tendons and muscle (St. Clair 2004). Ribs were often cut transversely multiple times, which resulted in great fragmentation and shattering (St. Clair 2004). Other knives used in the butchering process include beam knives or *pelador para gamuza*, which tanners used for the purposes of scraping hides (Simmons and Turley 1980).

In residential contexts, a variety of functional metal tool technologies produced a host of modifications on faunal remains. Examples specific to kitchen and food preparation, include meat hooks, or *garabato de carnicero* hung from the ceiling; these hooks. Such four-pronged hooks were used to suspend meat or carcasses from house ceilings (Simmons and Turley 1980). Small kitchen knives, or *cuchillos carnizeros*, were deployed for food preparation and consumption. The peasant knife or *cuchillo de cintura* was conveniently transported in a belt or sash, and was also known as *belduque* (Simmons and Turley 1980). Other common knives included the *machete*, originally intended to serve as a weapon, but used as a multi-purpose tool (Simmons and Turley 1980).

Spanish colonial axes used in residential contexts were similarly used to

Figure 5. Examples of Spanish colonial and Mexican era ranching tools and cutting implements. Photo courtesy Larry Angier, lighting assistance Martín Vargas, and Photoshop composite Ruben G. Mendoza, 2013.

dismember and disarticulate appendicular or limb bones of a given animal carcass. Such practice appreciably increased the breakage of the middle or diaphysis shaft of appendicular bones (St. Clair 2004). The foregoing description of butchery practices and associated tool technologies are consistent with those cultural modifications noted on the faunal remains recovered from the Royal Presidio of Monterey.

Appendicular skeletal elements broken at, or near the diaphysis of the shaft,

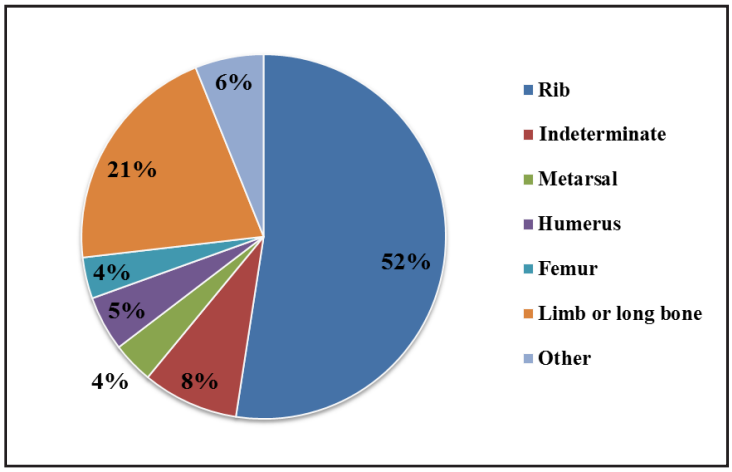
may in fact have been modified as such by axe cuts or strikes, also referred to as "cleaving." Knives, on the other hand, were specifically used for severing tendons and removing muscle attached to those skeletal elements recovered (St. Clair 2004). The use of knives to cut ribs would have resulted in great fragmentation and shattered bones of these types recovered in the largest quantities at the Royal Presidio Chapel. Such breakage likely resulted from decay over time, although it is possible cultural modifications, such as the removal of the *fresada*, or that portion of meat covering the ribs, such as that described at the Ontiveros Adobe (St. Clair 2004; Gust 1991) may also been a contributing factor to fragmentation. In the course of the experimental butchery no ribs were broken or fragmented. Therefore the removal of the *fresada* and/or butchering of the ribs may have been related to the usage of an axe, as opposed to a machete, cleaver, or obsidian flake cutting implements similar to those utilized in the experiment.

The RPC Faunal Collection

The examination of a sizable number of individual faunal skeletal elements (ca. 1,000 specimen lots) recovered from the Royal Presidio of Monterey was undertaken for the purposes of this analysis (Lucido 2012; Mendoza 2012). The faunal assemblage produced a distinct sub-sample from the total collection dominated by culturally modified faunal elements. The tabled data and charts included here represent raw quantitative projections of the overall sample.

Figure 6 provides a representative sample of those skeletal elements that predominated within the collection. Of those skeletal elements sampled and identified, rib fragments constitute the majority, or 52% of those culturally modified faunal remains from the collections of the Royal Presidio of Monterey. The relative percentages or proportions of specific elements represented may in fact be skewed, particularly given the number of fragmented skeletal elements within the sample lots. A number of these could not be distinguished from ribs or thoracic vertebrae and subsequently considered indeterminate rib fragments. The second most frequently identified body of skeletal elements from the collection included appendicular or long bones (femoral, humeral, and metapodials) represented at 21%. Of those cutmark types that predominated within the sample studied, chop mark patterns constitute the largest frequency (33%) of those culturally modified faunal remains from the Presidio of Monterey. Fine cutmark patterns constitute 30%, while remaining cutmark patterns reflecting the highest percentages of culturally modified specimens include those pertaining to dismemberment, scrape marks, clean cuts, chopping, breakage, and combinations of those features noted.

Figure 7 illustrates the relative frequency of cutmark patterns identified with specific bones, as derived from that sample of culturally modified Presidio faunal elements that have since undergone analysis. The numbers on the y-axis represent a raw count of culturally modified speciems. As noted before, both rib bone elements with chop marks and fine markings were deemed most relevant to our analysis of cultural modifications in the sample. Furthermore, cutmarks identified with ribs constitute the majority of the faunal collection under study, and as such, an apparent emphasis and or preference for torso-related meat cuts from the collections at Monterey have been so noted. Yet another observation drawn from the sample population of culturally modified bone elements is that pertaining to the presence of (a) the clustering of cutmark types on particular bones and bone localities (consumption related), and (b) multiple types of cutmark patterns, of which a total complement of seven patterns were distinguished, such as that identified with appendicular, or leg bones.



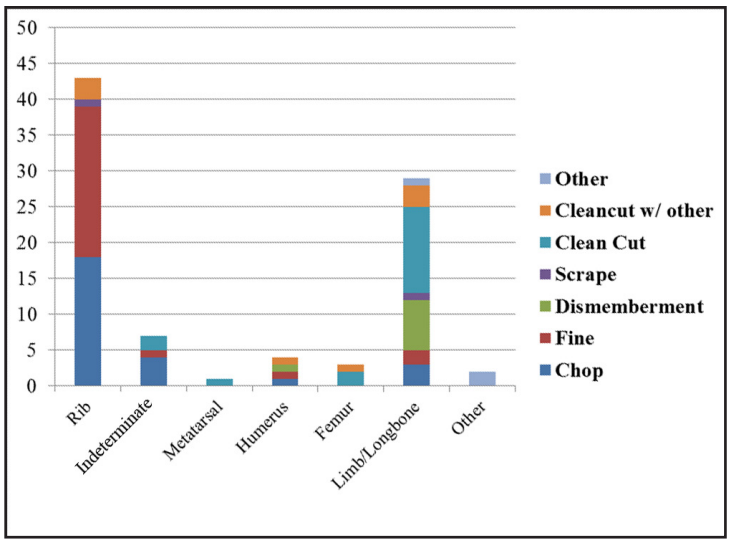


Figure 6 (top). Pie chart representation by percentage of those categories of faunal remains recovered from the excavations at the Royal Presidio of Monterey undertaken by the CSU Monterey Bay Institute for Archaeology. Chart by author.

Figure 7 (bottom). Bar graph correlations of archaeologically-recovered faunal remains and comparative cutmark patterns identified with specific skeletal elements. The numbers on the y-axis constitute raw counts. Chart based on quantitative analysis by David L. Collyer, III and Jennifer A. Lucido.

Experimental Procedures and Results

The experimental archaeology component specific to this study sought to replicate those Spanish colonial cultural modifications identified from archaeologically-recovered faunal remains specific to the Royal Presidio of Monterey. The analysis of culturally modified faunal remains for this analysis was undertaken at the CSU Monterey Bay Institute for Archaeology laboratory, where faunal remains were systematically culled for those specimens exhibiting those modifications so noted. Whereas, CSU Monterey Bay Social and Behavioral Science graduate David Collyer served as research assistant and butcher for the experimental archaeology component, the butchery proper was videotaped and photographed by Professor Mendoza, who was in turn assisted by Institute for Archaeology research assistant Jewel Gentry, while this investigator maintained notes, systemized and catalogued the specimens, and undertook the analysis and interpretation of the collections examined.

The meat samples subjected to the butchering exercise were obtained from a Monterey area grocery store, and totaled nine specimens. The meat

specimens were selected on the basis of their proportional representation in the overall archaeological sample. The meat selections included: 1) five beef back ribs; 2) three beef soup bones (i.e., shank or limb); and 3) a single pork shoulder. These were deemed appropriate samples, particularly the beef back ribs, as these represented the majority of the culturally modified faunal remains of the RPC collection.

Figure 8. CSU Monterey Institute for Archaeology laboratory work station where experimental archaeology was undertaken by Jennifer A. Lucido and David L. Collyer III. Photo courtesy Ruben G. Mendoza, 2011.

In this experiment, three cutting implements were deployed, including: (a) a Spanish colonial-style machete with a flared-edge collected in Baja California by blacksmith John Grafton; (b) a colonial-style cleaver/machete with a trapezoid-shaped straight-edge provided by Professor Mendoza, and obtained from the replica collections of Old Mission San Juan Bautista; and (c) five un-retouched obsidian flaked knives or flakes created by Mendoza by way of the lithic reduction or flintknapping nodules obtained from Lassen County, California, deposits. Finally, Grafton provided a wooden butchers block or cutting board of the type documented from both Mission era and contemporary Baja California butchering contexts

Each meat portion was subjected to butchery with each of the three separate cutting implements described in the foregoing section, and was then bagged and labeled according to the cutting implement used. Having successfully replicated the cutmark patterns noted from the archaeologically-recovered specimens, all specimens were then boiled in separate vats with the addition of two to three cups of bleach in order to expedite the sloughing or removal of meat, fat, periosteum, and other organic matter adhering to the skeletal elements. Specimens were soaked in the aforementioned solution for a 24 hour period, and then the bones were boiled again, and then rinsed with lukewarm water as to avoid flaking. The bleach-based defleshing technique averted the creation of additional cultural modifications that may accrue from defleshing procedures dependent on the use of steel implements. The "bare bones" thus created thereby represented an adequate comparative analytical sample for the historically-modified faunal specimens obtained from the collections of the Royal Presidio of Monterey. The resulting cultural modifications or experimental cutmarks thereby produced with rib, soup bone, and pork shoulder elements are listed and described in the following section. The experimental cutmarks are listed by order of that

cutting implement used to attempt reproduction of similar cutmarks (i.e., machete, cleaver, and or obsidian flake).

Figure 9. Metal cutting implements, and butcher block, crafted and or collected by blacksmith John Grafton for purposes of experimental archaeology effort at CSU Monterey Bay laboratory. Photo courtesy Ruben G. Mendoza, 2012.

Machete

Specimen 1.1: Chop and saw marks identified with indeterminate rib elements were recreated by way of machete on Specimen 1.1. Research assistant and butcher, David Collyer, reproduced both chop and saw marks with moderate ease. Experimental cutmarks very closely resembled those chop and saw marks observed in the archaeological samples. Of those specimens from the experimental sample, cultural modifications recreated correlated closely with their appearance on the archaeologically-recovered samples. Cut marks, or cut-through elements, were noted as biased toward the midsection portions of those indeterminate rib fragments examined, with repetitive and closely-spaced striations indicated for the experimental samples. We hypothesize that the multiple and closely-spaced, or tentative, cutmarks are the result of two independent, but often correlated factors. First, the relative inexperience of the butcher may result in the creation of multiple and closely-spaced and or tentative chop marks. It should be noted however that in this instance the lab-based and resource-limited nature of the exercise precluded extensive preliminary training for the research assistant assigned the task of butchering the experimental sample. Second, the inefficacy of the given cutting tools used, particularly those like the cleaver whose temper strength was compromised or inadequate, resulted in the production of breakage patterns on the tool itself; thereby limiting the effectiveness of the attempted cut-through or chopping of the bone material. Therefore, we believe that the two aforementioned conditions will permit us to identify those instances where archaeologically-recovered samples were bearing multiple chop and or saw mark patterns indicate the inefficacy of the butchering tools used, and or the inexperience of the butcher using said tools.

Figure 10 (below). Table of comparative experimental archaeology and archaeologically recovered specimens, and associated cutmarks identified with the Royal Presidio of Monterey. Table by author.

Specimen	Cutting Implement	Species	Skeletel Element	Cutmark Type	Reference RPC Specimen	RPC Cat. No.
1.1	Machete	Sus scrofa (domesticated pig)	Rib	Chop / Fine / Saw marks	1	RPC_00967.01v1
1.2	Machete	Sus scrofa (domesticated pig)	Rib	Chop mark	1	RPC_00967.01v1
1.3	Machete	Sus scrofa (domesticated pig)	Rib	Fine mark	1	RPC_00967.01v1
1.4	Machete	Sus scrofa (domesticated pig)	Appendicular	None	N/A	N/A
1.5	Machete	Sus scrofa (domesticated pig)	Scapula	Dismemberment / Chop marks	5	RPC_02652.07v1
2.1	Cleaver	Sus scrofa (domesticated pig)	Rib	Chop mark	1	RPC_00967.01v1
2.1	Cleaver	Sus scrofa (domesticated pig)	Rib	Saw mark	2	RPC_01162.02v1
2.2	Cleaver	Sus scrofa (domesticated pig)	Appendicular	Chop mark	6	RPC_01848.03v3
2.3	Cleaver	Sus scrofa (domesticated pig)	Scapula	None	N/A	N/A
3.1	Obsidian Flake	Sus scrofa (domesticated pig)	Rib	Fine mark	3	RPC_00151.01v1
3.2	Obsidian Flake	Sus scrofa (domesticated pig)	Appendicular	Chop / Fine marks	4	RPC_01766.01v3
3.3	Obsidian Flake	Sus scrofa (domesticated pig)	Scapula	Chop mark	5	RPC_02652.07v2

Specimen 1.2: The butchering of rib Specimen 1.2 easily produced straight, clean cuts of meat needed for separating the meat from the bone. However, only a single vertical machete chop mark was identified on the rib specimen in the final analysis. Taken together, the archaeologically-

recovered specimens seldom, if ever, produced clean-cut or cut-through specimens; although indeterminate rib Specimen 1.1 produced a ¾ cut-through, although not a clean cut per se.

Specimen 1.3 Despite those efforts documented to create cutmarks on rib Specimen 1.3, no such evidence of cutmarks could be discerned on this bone in the final analysis. However, it should be noted that in this particular instance efforts were made to reproduce those fine or superficial cutmarks observed within the RPC collections. The attempted replication of those fine or superficial cutmarks noted from the archaeological specimens were made possible only by way of the tentative or mimimal application of pressure when chopping or cutting, and or when the machete was struck at a diagonal angle. Furthermore, research assistant Collyer experienced some resistance to the effective cutting of Specimen 1.3.

Figure 11. Pork meat cuts subjected to experimental archaeology analysis as depicted prior to the butchering exercise undertaken by Lucido and Collyer. Photo courtesy Ruben G. Mendoza, 2012.

Specimen 1.4: Experimental outcomes noted for Specimen 1.3 were found to recur with Specimen 1.4. During attempts to chop this particular soup bone, the cutting implement readily sliced through the meat, but left no cutmarks on the underlying bone. When Collyer attempted to saw through Specimen 1.4, he found that the cut was affected easily, yet the cut was largely restricted to the fat content, and left no discernible cultural modifications on the bone.

Specimen 1.5: The butcher experienced pronounced resistance to cutting through the pork shoulder, but found that the machete rendered the fat more readily. However, as the machete was unable to effectively penetrate the uppermost layer of pig skin by way of mere chopping or slicing alone, a secondary attempt was made to saw through the tougher skin layer in order to expose the underlying meat. Once penetrated, and the underlying meat exposed, the machete was used to readily trim and deflesh the pork shoulder. This permitted ready access to the underlying meat and bone. In addition, dismemberment of the joint was facilitated through chopping and sawing. However, this proved the most challenging aspect in the entire experimental butchery process. Multiple horizontal striations were identified with the dismemberment technique so noted.

Cleaver

Specimen 2.1: The cleaver readily cut through rib bone, but did not easily separate meat from bone. This was particularly true even when scraping along the shaft of the bone, and or sawing. Chopping with this implement was particularly challenging as the research assistant met pronounced resistance with Specimen 2.1. Moreover, the cleaver was damaged during the course of the first experiment. However, multiple chop and saw marks were subsequently identified.

Specimen 2.2: The substandard effectiveness of the cleaver was revisited with the cutting of Specimen 2.2, a pork soup bone. However, a V-shaped cutmark, resulting from chopping with the cleaver, was noted in the final analysis.

Specimen 2.3: The use of the cleaver to chop meat from the pork shoulder was similarly ineffective. This was particularly true with attempts to render flesh identified with Specimen 1.5. However, once the uppermost layer of skin was broken, the cleaver easily sliced the underlying meat, while failing to produce evidence for cutmark patterns.

Figure 12 (top). RPC Specimen 1 (left) consists of a chopped indeterminate rib fragment recovered from archaeological contexts (CA-MNT-277_00967.01v1). Similar chopmark patterns were replicated in experimental archaeology Specimen 2.1 (right). Photo by author.

Figure 13 (middle). RPC Specimen 2 (left) consists of chopped indeterminate rib fragment recovered from archaeological contexts (CA-MNT-277_01162.02v1). Note similarly spaced striations for experimental archaeology Specimen 2.1 (right). Photo by author.

Figure 14 (bottom). RPC Specimen 3 (left) consists of an archaeologically-recovered indeterminate rib fragment with multiple cutmarks (CA-MNT-277_00151.01v1). Compare experimental archaeology Specimen 3.1 (right) with chop scar and fine parallel marks. Photo by author.

Obsidian Flake Tools

Specimen 3.1: The obsidian flake tools readily sliced and separated the meat from the rib bone. However, obsidian flakes and debitage from the flake became embedded into meat during this process. The ability to cut and slice the meat was successful, but relatively slow as the obsidian flakes dulled after initial use, and use wear was readily noted. Ultimately, the obsidian flake produced a single very fine cutmark on Specimen 3.1, and in addition, one flake scar was noted from the bone analysis.

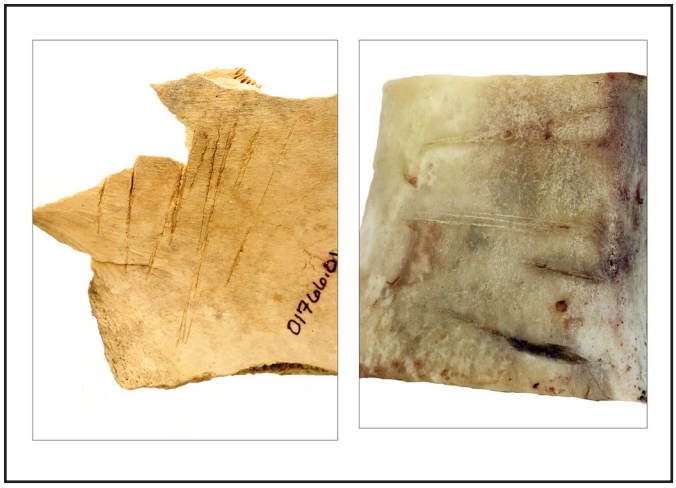


Figure 15 (above). RPC Specimen 4 (left) consists of archaeologically-recovered indeterminate specimen with fine cutmarks (CA-MNT-277_01766.01v3). Compare experimental archaeology Specimen 3.2 (right) with fine cutmarks produced with obsidian flakes. Photo by author.

Specimen 3.2: In this instance, a second obsidian flake was used to cut and separate meat from a soup bone. The flake retained its sharp edge longer than the first obsidian flake used on Specimen 3.1. Again, meat was readily sliced and separated from most portions of Specimen 3.2, although ligaments and cartilage affected the effective use of the tool. In addition, use wear damage to the obsidian flake resulted in the contamination (with obsidian debitage) of that meat separated from the bone. Specimen 3.2 exhibited a chop mark as well as fine parallel cutmarks similar to those from Specimen 3.1. A single fine V-shaped cutmark was similarly noted for the specimen.

Specimen 3.3: A third obsidian flake was used to slice and separate meat from the pork shoulder. The flake effectively cut and sliced through that meat identified with the pork shoulder. As noted with the other cutting implements, the ability to penetrate the uppermost layer of skin proved particularly difficult. However, when the layer of skin was pulled taut, the obsidian flake proved more effective and ultimately cut more deeply. Again, as in all cases where obsidian cutting implements were used, use wear damage to the obsidian tools resulted in the contamination of the meat.

Figure 16 (below). RPC Specimen 5 (left) consists of archaeologically recovered proximal tubercle and head of rib specimen identified with dismemberment and chopmarks (CA-MNT-277_02652.07v2). Compare with experimental archaeology Specimens 1.5, 2.3, and 3.3 (right) with chop scars and fine parallel cut marks. Photo by author.

Ultimately, Collyer (the experimental butcher) concluded that the machete proved the most effective cutting implement of those selected for the experiment. Collyer ultimately ranked the machete as the most effective and reliable tool for the butchering of the pork meats in question. The obsidian flake, by contrast, proved difficult to handle, and its particularly sharp cutting edge dulled after initial use. Finally, Collyer determined that the cleaver was the least effective cutting implement deployed during the experiment in question. In that regard, the cleaver proved generally ineffective in rendering the pork

meats subjected to the test. Similarly, said damage noted from obsidian tool use, its effectiveness was diminished as the result of that splintered cutting edge borne of use wear damage.

Conclusion

The prevalence of butchered cattle remains recovered from those Spanish colonial contexts reviewed herein necessarily reifies the ultimate importance of the early California ranching industry for the earliest years of the colony. However, findings do not indicate a substantive difference between butchery cutmark patterns produced by colonial metal implements and Native Californian lithic tools; although this investigator acknowledges that the tool marks themselves are distinctive, particularly when subjected to microscopic analysis. Such conclusions align with those of Michelle St. Clair's (2004) analysis of the faunal assemblages recovered by Mendoza (2009b) from Mission San Juan Bautista. St. Clair (2004) concluded that those consumption, and/or butchery patterns and practices, generally thought or assumed to distinguish the mission's neophyte population from that of Spanish colonials simply do not hold where the analysis of butchered cattle remains are concerned. Alternatively, where the Ontiveros Adobe and Presidio of San Francisco are concerned, neither site bore evidence of the *Californio*-style butchering process. Therefore, *Californio*-style butchery techniques likely emerged in the wake of the Spanish colonial and Mission eras.

Ultimately, the prevalence of cattle and other faunal remains recovered from Spanish colonial sites serves to document the fact that the introduction of a ranching economy effectively impacted the dietary practices and traditions of the Native Californians of the region. Recent findings in turn serve to validate a growing body of evidence from throughout the Americas for arguments concerned with a cultural continuum bridging Spanish colonial and Native Californian butchery practices. Moreover, the identification of cultural modifications to faunal remains recovered from the Royal Presidio of Monterey did not effectively serve to distinguish Hispanic butchery and consumption practices from those of the local Native Californians. Cutmarks in each instance were virtually indistinguishable.

I hereby suggest that socio-cultural and economic distinctions between the presidial soldiers, and the Native Californian laborers and families residing at the Royal Presidio of Monterey, cannot at this time be discerned from the faunal evidence and analysis alone. Clearly, much further analysis, inquiry, and experiment is warranted at this time. However, it should be noted that the population of soldiers, or *gente de razón*, consistently exceeded that of Native Californians for much of the colonial history of the Royal Presidio of Monterey. Given that the population of Native Californians at the Presidio was in a continuous state of flux, and that largely depending on the

numbers of neophyte and gentiles laborers contracted at any given time, the extent of Native Californian participation in the butchering of cattle at the Presidio varied through time. Nevertheless, I may infer that those Spanish and Native Californians who participated in the butchering of cattle, and the processing of the resulting meat allotments, did so for the whole of the population of the Presidio. Moreover, as was the case throughout Spanish colonial America, those indigenous servants and laborers who more readily adopted the trappings and practices of the colonial world more readily secured a degree of social mobility for themselves and their descendants.

Endnotes

1. I hereby thank former CSU Monterey Bay student David L. Collyer III for his role in facilitating the experimental butchery exercise. I am similarly indebted to John Grafton for freely providing advice as per his expertise with Spanish colonial ironwork, and for providing access to reproductions of Spanish colonial cutting implements used in the experimental archaeology. CSUMB archaeology student Jewel Gentry advanced additional suggestions for the revision of this manuscript and CSU East Bay master's candidate Brenna Wheelis in her professional review of faunal terminology. Dr. Gerald Shenk, Chair of Social and Behavioral Sciences at CSUMB, critiqued earlier drafts of manuscripts pertaining to this research. Finally, I thank Dr. Rubén G. Mendoza of the Institute for Archaeology of CSUMB, for furthering this study by way of generously provisioning access to his field notes and materials, and both faunal specimens and archaeological materials recovered from his investigations at the Royal Presidio of Monterey (2006-08). In addition, Mendoza prepared a detailed critique and advanced a host of editorial suggestions for an earlier draft of this manuscript, and permitted the reproduction of those research materials represented in Figures 1, 2, 4, 5, 8, 9, and 11.

2. Duration and frequency of *paseos* varied per mission.

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