OSTEOLOGICAL EVIDENCE OF TRAUMA AND INTERPERSONAL VIOLENCE AT CA-ALA-343 IN FREMONT, CALIFORNIA

A thesis submitted to the faculty of
San Francisco State University
In partial fulfillment of
The Requirements for
The Degree

Master of Arts
In
Anthropology

by

Phillip Grant Reid

San Francisco, California

May 2010

CERTIFICATION OF APPROVAL

I certify that I have read Osteological Evidence of Trauma and Interpersonal Violence at CA-ALA-343 in Fremont, California by Phillip Grant Reid, and that in my opinion this work meets the criteria for approving a thesis submitted in partial fulfillment of the requests for the degree: Master of Arts in Anthropology at San Francisco State University.

_____

Dr. Mark Griffin
Associate Professor of Anthropology

_____

Dr. Gary Pahl
Professor of Anthropology

OSTEOLOGICAL EVIDENCE OF TRAUMA AND INTERPERSONAL VIOLENCE AT CA-ALA-343 IN FREMONT, CALIFORNIA

Phillip Grant Reid
San Francisco, California
2010

The effects of the Meganos Intrusion into the San Francisco Bay Area, during the Middle Period from 500 BC - 700 AD, on the ancestral Ohlone people who occupied the area, are not well understood. What is known from the skeletal population from CA-ALA-343, which was split into three groups (ancestral Ohlone, Meganos, and indeterminate), is that there have been many skeletons found with deliberate traumatic injury. This study hypothesized that as a result of the two cultural groups occupying the same geographical area, the there would be higher incidence of deliberate traumatic injury (interpersonal violence) in the CA-ALA-343 as a consequence of the Meganos' presence. The data was compared with prior research and other contemporaneous archaeological populations in the San Francisco Bay Area and found that the data did not to support the theory. The research indicated that although the rate of deliberate trauma is high, it is not significantly higher than other locations within the Bay Area, as well as throughout California.

I certify that the Abstract is a correct representation of the content of this thesis.

_____ _____

Chair, Thesis Committee Date

ACKNOWLEDGMENTS

I would like to thank my wife and fellow archaeologist Amy McCarthy for all her support and encouragement. I also wish to thank my committee, Dr. Mark Griffin and Dr. Gary Pahl for all their input and encouragement over the years. Without the assistance of Dr. Jeff Fentress, Christine Marshall, Chris Canzonerri, Andrew Galvan, Rick Thompson, Mark Hylkema, and Dr. Robert Jurmain this effort would have never come to fruition. I would also like to Dr. Douglass Bailey for all his help managing all the various departmental requirements and protocol. I wish to thank Ed and Kathy McCarthy for all their support over the course of this endeavor.

TABLE OF CONTENTS

LIST OF FIGURES

Figure Page

LIST OF TABLES

Table Page

LIST OF APPENDICES

Appendix Page

INTRODUCTION

The goal of this thesis is to test the hypothesis that the rates of deliberate traumatic injury are high at CA-ALA-343. A secondary hypothesis is that the presence of the Meganos created social pressure that drove an increase in deliberate trauma at the site. It appears that two different cultural groups were occupying CA-ALA-343 at the same time. The site had previously been characterized as a Meganos site (Hall et al 1988) due mainly to the presence of extended burials. There are flexed burials as well. These two different burial modes are interpreted as the Meganos and the ancestral Ohlone.

Cultural Chronology

In order to understand the cultural patterns that affect this study, a brief overview of San Francisco Bay Area (hereafter SF Bay Area) archaeology is required since the identifying cultural traditions used to delineate the skeletal populations are dependent on archaeological evidence. Beardsley devised the Central California Taxonomic System (CCTS), to differentiate between cultural groups in California, here after the CCTS (Beardsley 1948:4-9).

The system uses stylistic changes in artifacts, changes in mortuary treatment, and site formation or use to delineate cultural phases of a particular culture, or in this case the advent of an entirely different cultural tradition, within a geographic area. Sites were categorized into Early, Middle, and Late periods. These were subdivided into phases to attempt to encompass the widely varying cultures and cultural traditions in central California. Over the intervening years, the use of CCTS has come to be thought of as too rigid to accommodate the kinds of regional complexity seen in California archaeology. In 1987, Bennyhoff and Hughes attempted to replace the CCTS based on a chronology based on *Olivella* bead types and calibrated carbon dates from sites around California (Bennyhoff and Hughes 1987). At the same time, Fredrickson attempted to better define cultural traits and taxonomic sequences for central California. In 1993, Milliken and Bennyhoff further adjusted their bead based chronology (Milliken and Bennyhoff 1993). The chronological scheme used within this thesis will be derived from Bennyhoff and Milliken's study of temporal change in bead style in Central California for ease of use and current popularity.

Table 1. Chronology for the Prehistoric SF Bay Area.

Calendar Year	Dating Scheme B1[1]	Temporal Categories[2]
1800 AD	Historic period	Late Period Phase 2
1700 AD	Late period Phase 2-B	
1500 AD	Late period Phase 2-A	
1300 AD	Late period Phase 1-C	Late Period Phase 1
1100 AD	Late period Phase 1-B	
900 AD	Late period Phase 1-A	Middle to Late Transition
700 AD	Middle to Late Period Transition	
500 AD	Middle Period Terminal Phase	Upper Middle Period
300 AD	Middle Period Late Phase	
100 AD	Middle Period Intermediate Phase	Lower Middle Period
200 BC	Middle Period Early Phase	
500 BC	Early to Middle Period Transition	Early Middle Period
3000 BC	Early Period	

[1] After Bennyhoff and Hughes 1987:149. [2] After Milliken and Bennyhoff 1993.

Early Holocene (8000 BC – 2000 BC).

The Early Holocene is characterized by an incomplete view of a "generalized mobile forager" pattern (Milliken et al 2007:114). Large lanceolate and stemmed projectile point types and wide stemmed point appear in sites around the margins of the San Francisco Bay. In the East Bay, the earliest known Early Holocene site is CA-CCO-696 at Los Vaqueros Reservoir. The site was dated from a charcoal sample associated with a milling slab, buried between 390 and 415 centimeters below ground surface (cmbs). The earliest known grave from this period was discovered at CA-CCO-637, near where the milling slab was found at CA-CCO-696, dated to 3490 BC.

Early Period and Windmiller Pattern (2000 BC – 500 BC).

The Early Period was characterized by the Windmiller pattern, first identified in the San Joaquin-Sacramento Delta by Lillard and others (Lillard et al 1939). The cultural pattern contains milling slab, manos, mortar and perstles, as well as the large lanceolate and stem point types (Hylkema 2002). Ventrally extended burials oriented to the west with large amounts of grave goods characterize Windmiller cemeteries. The Windmiller pattern is thought to have focused on a mixed economy of game, fish and varied vegetal foods.

Middle Period and Berkeley Pattern (500 BC – AD 700).

The Middle Period is characterized by the Berkeley Pattern. The Berkeley Pattern is defined by the economic adaptive strategies based around the extensive and rich tidal marsh environment of the San Francisco Bay at the time. Early representations of the Berkeley Pattern show a shift to large shell mounds located near water sources with the presence of projectile points and atlatls, which suggest that hunting was still an important part of subsistence (Hylkema 2002). Berkeley Pattern assemblages generally show a decrease in the presence of milling slabs and hand stones and a shift to the mortar-and-pestle technology, indicating an increased dependence on acorns. However, site assemblages within the southern Bay Area still contain milling slabs and hand stones throughout the Middle and Late Periods, indicating a continued reliance on hard seeds in combination with acorns (Hylkema 2002). Within the southern SF Bay Area, the Berkeley Pattern is illustrated by a heavy reliance on the bay-shore environment, showing a low frequency of projectile points. The most commonly found point types are contracting stemmed and lanceolate points. Berkeley Pattern assemblages also contain an abundance of bone implements, including the particularly diagnostic double-pronged fish spears, serrated scapula, and beveled elk antler wedges (Hylkema 2002).

Late Period and Augustine Pattern (700 AD – Contact).

The Late Period is characterized by the Augustine Pattern. An economy based on intensive fishing and shellfish gathering, acorn harvesting and hard seen gathering are indicative of this period. Sedentism, social hierarchy, regular regional exchange and ceremonialism increase during this time period. The introduction of the bow and arrow in the SF Bay Area dated to this period (Moratto 2004). Diagnostic Augustine artifacts include small serrate Stockton series projectile points, clay effigies, bone whistles, steatite pipes and other non-utilitarian artifact types. Augustine cemeteries are typified by and increase in grave offerings (ceremonial objects, *Olivella* beads and *Haliotis* ornaments) and randomly oriented flexed inhumations. Cremation is also present with regional variability. The increase in grave offerings generally suggests an increase in social hierarchy (Milliken et al 2007).

The Meganos Intrusion and Meganos Pattern (500 BC to 700 AD).

The Meganos lived in the San Joaquin Delta, and beyond Sacramento into the Central Valley. According to Hylkema (2002:245) the Meganos Intrusion represented the "root" of a migration from the Sacramento-San Joaquin River delta in the Stockton district. The

intrusion of the Meganos into the SF Bay Area took place between 500 BC and 700 AD. The Meganos spread into the Livermore, Diablo and Santa Clara Valleys before reterating back into the San Joaquin- Sacramento Delta. Bennyhoff surmises that the Meganos were culturally absorbed by the ancestors of the Valley Yokuts by the end of the Middle Period (Bennyhoff 1987:83).

The Meganos Pattern is characterized as a hybrid of the artifact and burial customs that resemble the earlier Windmiller Pattern, but also have some Berkeley Pattern traits. Meganos cultural traits include distinct artifact types (ceremonial obsidian and chert blades, quartz crystals and other non-utilitarian objects) and ventral extension with a westerly orientation in burials and internment in areas adjacent to village sites rather than within them (Bennyhoff 1968).

Archaeologically, the Meganos were first identified by Heizer in 1938, when he noticed an “atypical horizon" at the Orowood site (CA-CCO-141) characterized by ventral extension as a dominant burial mode (Bennyhoff 1987:81). Bennyhoff lists several sites in ancestral Ohlone territory that contain components that exhibit the same Windmiller Pattern mortuary practice with some Berkeley Pattern traits (Bennyhoff 1968). He came to classify these sites as evidence of the Meganos Pattern.

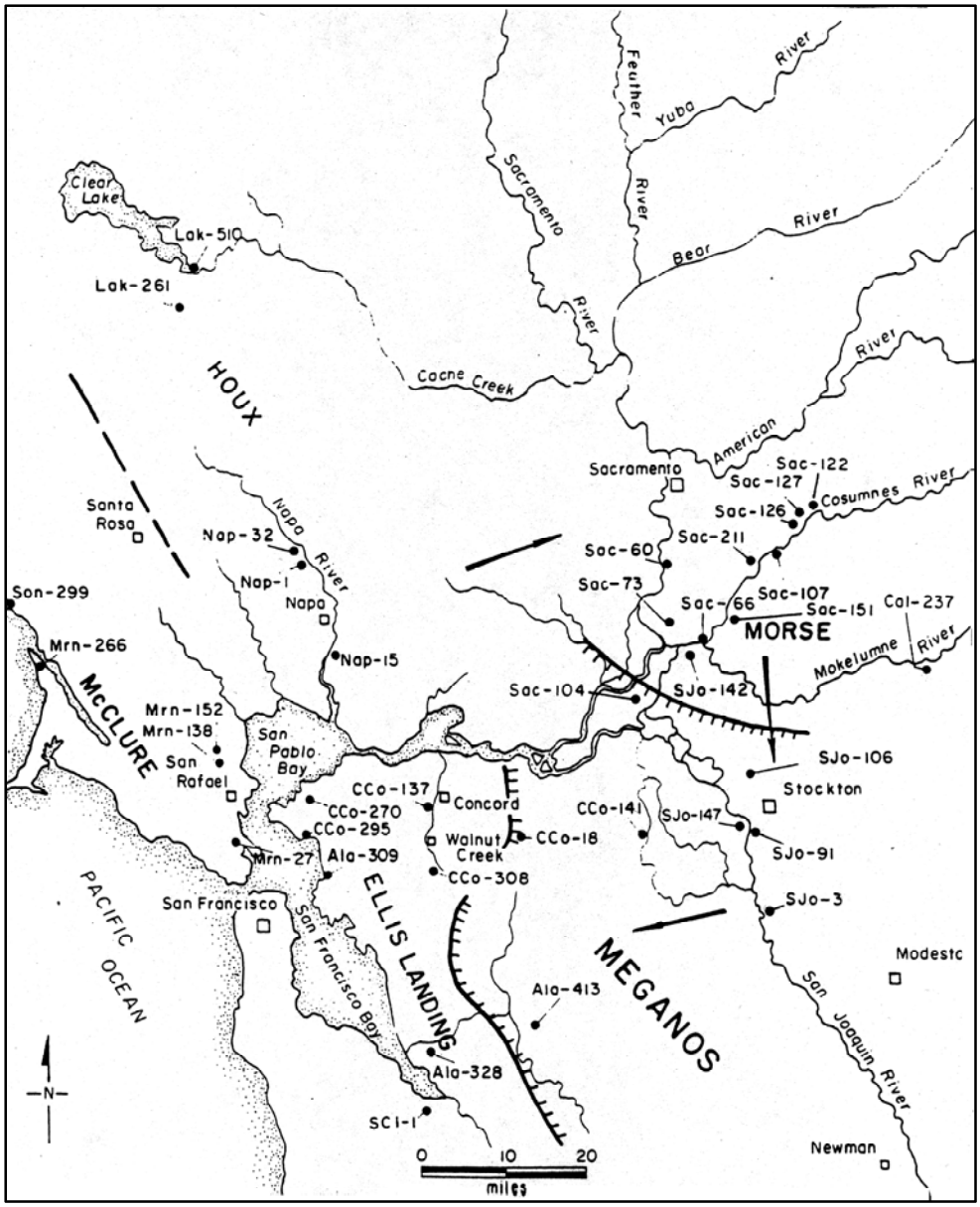

Figure 1. Meganos Intrusion during the Early to Middle Period Transition 500 BC to AD 100 (Bennyhoff 1987:84).

The effects of the Meganos Intrusion into the SF Bay Area and on the ancestral Ohlone people who occupied the area are not well understood. Although the Meganos Intrusion was identified by Bennyhoff (1968), and its cultural material assigned to a pattern, little is known about the interactions between the Meganos and the ancestral Ohlone.

In order to test the first hypothesis that rates of deliberate traumatic injury are high at CA-ALA-343, I compare the rates of traumatic injury from CA-ALA-343 to other contemporaneous archaeological populations for the SF Bay Area with and without evidence of the Meganos Intrusion (500 BC and 700 AD). The secondary hypothesis, that the rate of deliberate traumatic injury is elevated by the presence of the Meganos at CA-ALA-343 will be tested by comparing the rates of deliberate trauma within the Ohlone and Meganos populations from CA-ALA-343.

Although a few regional views of deliberate trauma that deals with possible causes rooted in the archaeological setting of the SF Bay Area from which they arise has been carried out (Andrushko et al 2005, Andrushko et al 2010, Wiberg 2002), previous studies in the area dealt with only one site (Jurmain 1991, Strothers 2003) or were California wide overviews without specific causes or interpretations (Tenney 1986, Pastron 1973).

This study addresses the need for a regionally integrated view of deliberate traumatic injury that tests hypotheses about possible causes (like Pilloud 2003).

To address this problem, I synthesize selected burial data from CA-ALA-343. For CA-ALA-343 I compare the rates of deliberate trauma between the two culturally different segments of the population, the Meganos and the Ohlone. In order to determine the cultural pattern to which each individual belongs, I differentiate between burial positions and artifact assemblages to assign individuals a "cultural affiliation". Although this study is designed to help illuminate the nature of the Meganos Aspect at CA-ALA-343 and its affects, there are limitations on a study of this kind.

Basing a determination of cultural affiliation on such variably expressed cultural traits as mortuary inclusions and burial position is difficult. As the Meganos moved south into the SF Bay Area, their culture is thought to have become more hybridized with traits from the pre-existing Berkeley pattern. Also, the data for the population under study was gathered by different people using different methods and research aims. Despite these limitations, I hope to further our knowledge of the interactions between two dissimilar cultures and how their relationship affected the complex prehistory of the SF Bay Area.

LITERATURE REVIEW

Accounts of warfare among the Ohlone are scant, and as the Meganos were no longer a distinct cultural entity at the contact period (Bennyhoff 1987:83) no information is available. Most accounts of warfare among the Ohlone are in the context of ethnographic descriptions from neighboring tribes (Kroeber 1965:297-301) or observations by Missionaries, or early European visitors to the area (Priestley 1937, Milliken 2008 and Milliken 1995). There are general features of warfare among the Ohlone that are true for most tribes in California (Heizer and Whipple 1971:36-39, Levy 1978:488-489). The principal weapon was the bow and arrow, although the spear or atlatl and dart were probably used before the introduction of the bow and arrow around 500 AD. Slings were known, but as hunting weapons rather than fighting implements. Although clubs were used often among the Chumash and other southern California groups, they are not mentioned in ethnographic or ethnohistoric accounts of warfare in the SF Bay Area (hither to refered to as the SF Bay Area). Although the Rumsen Ohlone wore “leather jackets” into battle (Broadbent 1972:73), armor as it was known in other parts of California or North America did not exist in the SF Bay Area.

We know from the few ethnographic sources that are available that warfare among the Ohlone was fought by ambush or by prearranged meeting (Levy 1978:488, Kroeber 1965:298). The prearranged battles were generally short and when one or two people were injured or killed, the others left the field (Broadbent 1972:73). Conflicts were usually fought due to territorial incursions, the taking of resources belonging to another group or the theft of women. During the Anza and Font expedition in 1776, Font wrote, "we came to another village where there was a great pile of shells of mussels which they get from the estuary, and for which one village often fights with another" (Milliken 1995:66). According to Milliken (2008:23-25), relations between tribelets generally took the shape of intermarriage and warfare. Ethnographic accounts from early explorers and visitors to the area indicate that warfare and feuding was the result of the theft of either resources or mates. The author states that violence generally took the form of ambush attacks on individuals or small groups or by prearranged "face-offs" by small groups but is not limited to either of these categories. Kroeber (1925) states,

> "The influence of the chief is said to have been limited, but several accounts mention that he took a leading part in war. This, if true, would be rather exceptional for California. Prisoners were not taken, or if so, were dispatched as soon as possible. The slain foe was mutilated or dismembered. His scalp carried about in triumph. It seems that the "scalp" was of the usual California kind: the head or its entire skin. Some parts of the enemy were eaten; it is said, by the parents of the slayer." (Kroeber 1925:468-469)

This information comes from contact period people, the Ohlone, and may have varied widely in pre-contact times among what are possibly the ancestral Ohlone people and biases are inherent in the first hand account of native peoples by European observers. Data regarding the specifics of warfare for the Meganos culture do not exist since the Meganos ceased to be a separate cultural entity long before contact based on the archaeological evidence (Bennyhoff 1987:83). With the rapid demise of the Ohlone people and their way of life in the face of the mission system, information about social tension or outright warfare at CA-ALA-343 (or anywhere else) will stem from bioarchaeological inquiry rather than ethnographic accounts.

In his ethnography of the Salinan Indians, whose territory bordered the Ohlone in the Santa Lucia Mountains, Mason (1912:180) reports that early explorer Fages (1775) said the Salinan, "Give no quarter to strangers and in these neighborhood of Monterey practice the custom of having the parents of the slayer eat the flesh of his victim. They are at continual war with their neighbors." Fages also states that the "…war consists of setting fire to some settlements, sacking it and bringing back some women married or single" (Mason 1912:180). Mason states it was also the custom of Salinan warriors to take trophies, "In war they took scalps from their enemies to use in the war dance; they also had the singular custom of cutting off the heads and arms of the enemies braves so as

to inspire them with valor" (Mason 1912:180). This custom seems to be less singular than Mason's informant thought, as trophy taking seems to have been widespread throughout the region (Andrushko et al 2005, Wiberg 1984, Strother 2003).

In her discussion of the Rumsen Ohlone of Monterey, Broadbent (1972:73) reports that a state of was between the Rumsen and the neighboring Esselen was perpetual. She draws of the writings of Fages who reports the leading cause of warfare in the area was "the transgression of collecting and gathering….and much war and killing rose from the infidelity of the women" (Broadbent 1972:73). Among the Rumsen, warfare was carried out through surprise attack or by appointment with bow and arrow and "leather jackets", possibly a form of armor. According to Laperouse in order to intimidate their enemies, victims "atrocities were committed on the first victims" and "a small part of his body may be eaten to honor his valor and increase that of the eater" (Mason 1912:73).

In the SF Bay Area, accounts of the missionaries indicate that the arrival of the Spanish in the area did little to ease, and probably exacerbated existing tensions between native peoples. Palou, a missionary, gives an account of an attack on the Yelamu, the tribelet nearest the newly established Mission Dolores by a neighboring tribelet, the Ssaslon, on August 12th 1775 (Milliken 1995:63). Palou states that the Ssaslon attacked not only the local Yelamu village but other of their settlements as well killing many on

both sides and burning the Yelamu villages to the ground. Although Milliken states the presence of the Spanish may or may not have been a catalyst for the attack, it does indicate that under certain circumstances the normal pattern of hostilities such as ambush attacks on gathering parties or prearranged line type battles may be abandoned and the elimination of a tribelet by an enemy may be attempted.

Fages states that according to the Salinan, the Esselen and Ohlone engaged in ritual cannibalism (Mason 1912:180) and Broadbent (1972:63) states the same occurred among the Esselen and Rumsen Ohlone as a result of their violent interactions. It is suggested that this ritual cannibalism was carried out in order to receive some of the victims' power (Mason 1912, Broadbent 1972).

Anthropological Studies of Warfare

There has been an increase in interest in the study of pre-state warfare in recent years. However, due to the effects of colonialism in the 19th and 20th centuries most pre-state societies are under the military control of a state and either cannot or will not engage in these kinds of activities as they would have during prehistory. The study of warfare and interpersonal conflict in general has undergone some changes in the last 50 years. In his treatment of the study of warfare in anthropology as it related to prehistoric war on the

Great Plains, Robacheck states that the study of warfare has vacillated back and forth between a purely biological or genetic predisposition to warfare in general to a culture specific explanation during the 1970's and 1980's (Robacheck 1994). Most of the data regarding warfare has been taken from Amazonia or New Guinea, and North America has been largely left out of the discussion until recently. This discourse is still anchored in either biological or cultural viewpoints. Robacheck frames the discussion of anthropological studies of warfare in term of two competing viewpoints, Materialist approaches and Sociocultural - Motivational approaches.

Materialist approaches, largely couched in an "ecological-functional" model of warfare, tend to use population pressure or resource scarcity as prime motivators with warfare being an adaptive response. In this view, warfare either creates "no mans lands" in which prey species can replenish their numbers or war as the direct cause in the reduction of populations to relieve resource stress (Robacheck 1994:308).

Sociocultural - Motivational approaches focus on what Robacheck calls the "proximate causes of warfare" (Robacheck 1994:308). These consist of mainly garnering prestige, advancing the goals of a social group or expressing aggressiveness fostered by harsh socialization practices. Although these offer a broader application than culture specific theories, Materialist theory has dominated anthropological thought about

warfare. As applied to the SF Bay Area in an archaeological setting, Materialist theory is readily applicable, as ethnographic accounts of warfare among native peoples center on trespassing on territory or wife stealing (Broadbent 1972, Mason 1912, Levy 1978, Milliken 1995). Conversely, a sociocultual view of warfare in the SF Bay area could help explain instances of trophy taking and dismemberment found at some archaeological sites (Wiberg 2002, Grady et al 2001, Strother 2003).

Robacheck states that the major issue that materialist theory have to overcome is that human beings are not machines carrying out a prewritten program of survival but rather actors in the their own time, place and cultural setting. All material reasons to engage in warfare are meaningless without agreeing in some way with the goals wishes and intentions of those who engage in it. Materialist explanations are not wrong, but that they lack linkage to the intentions and motivations of the people involved (Robacheck 1994:310).

Otterbein (2000b) interprets what he sees as the salient features of the study of war over the last 150 years, and how one paradigm's theories influence subsequent studies. The myth of the peaceful savage that began in the 1920's influenced the study of warfare until recently. It is this myth that began my interest in the topic of warfare in past societies. During the most of the twentieth century, pre-state or primitive warfare was

seen as more like a sport that a deadly endeavor, an idea precipitated by the myth of the peaceful savage. This paradigm became unsupportable given the growing body of evidence that pre-state was not always peaceful, during the late 1960's and early 1970's debates between materialists and sociocultualists.

Otterbein echoes some of Robacheck's (1994) concerns about purely materialistic approaches to the study of war, but goes on to say that recently anthropologists have begun to consider both the causes of warfare and its consequences. The author states that in the recent period, researchers are divided about not the intrinsic or extrinsic features of warfare but the nature of humankind's disposition towards war or peace. The central question for Otterbein revolves around whether war is a function of human nature of a result of social organization, the state. For Otterbein however, that it is not the cause of warfare *per se* that should attract the attention of modern researchers but the variation in the "nature and frequency" of warfare and the causes of that variation (Otterbein 2000b:802).

Otterbein (2000a) provides a rationale to define interpersonal conflicts in other societies. His studies are focused more upon modern feuding groups and so his analysis is based in terms of market and non-market economies to help define underlying causes for interpersonal violence and feuding. In market societies the underlying goal is seize

economic or political power and this is more important than “honor”. On the other hand, in non-market societies ones offended honor can be soothed with compensation. This was known to have happened in the SF Bay Area ethnographically (Milliken 1995:21) and would seem to be a common feature in tribal life in prehistoric California. It is this mechanism that allows hostilities to be overcome to avoid permanently damaging a tribal groups’ ability to hunt and gather effectively from the loss of too many members due to intergroup aggression.

Keeley’s work on anthropological studies of war details some of the causes and mitigating factors of war in both pre-state and state level societies. The author states that the study of warfare has until recently been in terms of its relationship to European or Anglo American powers and interests. Models used to explain warfare among pre-state societies were generally either “Hobsian,” expression of a life that was “solitary, poor, nasty, brutish, and short” or a “Rousseauian” noble savage, who lived in harmony with his brethren and his environment. Recently the study of war has come back into the general scope of anthropological discussion as the evidence for a past with periods of peace and war emerging from all corners of the globe. As the discussion of warfare widened, it gradually became theoretical argument between what Keeley calls, “Cultural Materialism and a variety of other –isms….” (Keeley 1996:15). As Keeley and other

subsequent authors (Walker 2001, Lambert 1994, Otterbein 2000b) have observed, warfare is a much more complicated interplay of environmental and cultural variables and cumulative individual actions. Universal "truths" concerning war in human societies are rare.

In Keeley's discussion of warfare, he devotes a chapter to the causes of warfare. In prehistoric societies, Keeley suggests that the Malthusian idea that population pressure on available resources may be a contributing factor in pre-state warfare but that other factors such as carrying capacity, surplus and other cultural buffers that mitigate resource scarcity. Population pressure is based on relative growth not absolute numbers (Keeley 1996:129) and depends as much on the perception of need and scarcity as the real lack of food and trade items.

By examining the prevalence of pre state warfare, its tactics, causes and contexts, Keeley paints a picture of pre-state warfare that is serious, effective and has a huge impact on the societies that participate in it. This is a view contrary to earlier anthropological interpretations (Turney-High 1991, Wright 1964) that saw warfare by pre-industrial cultures as ineffective, perhaps mistaking scale for effectiveness. Keeley tries to dispel this idea that pre-state warfare is ineffective by comparing casualty rates between modern countries like the United States and Great Britan and the Oneota

population reported on by Milner (Milner et al 1981). The author states that comparatively, the mortality rate among modern nations would have to increase 1400 times to be equal to that of Milner's population (Keeley 1996:67).

Keeley divides the types of warfare practice by pre-state peoples as: formal battles, small raids and ambushes, and large raids and massacres (Keeley 1996:59). He states that ethnographers have paid more attention to large "pitch" battles as they are more conspicuous. Anthropologists have compared these to modern battles between industrialized nations and concluded that has resulted in the misconception that primitive warfare is ineffective. As Levy (1978) indicates, pitch battles among the Ohlone were usually short and ended when a combatant was killed. In this way, they resemble many other cultures around the world such as the Tiwi of Australia (Otterbein 2000), the Maring of Papua New Guinea (Harris 1970) as well as the Yanomamo of South America (Chagnon 1968). The author suggests majority of war casualties come from ambushes and raids rather than battles (Keeley, 1996:66).

Keeley indicates that frontiers between cultural groups as a particularly dangerous place to be (Keeley 1996:130-131). The people who live on or near the frontier are more likely to be subject to raiding and ambush from opposing groups. Levy (1978) states that one of the causes for warfare among the Ohlone was trespassing on tribelet lands. As the

Meganos moved further south into ancestral Ohlone lands between 500 BC and 700AD (Bennyhoff 1987), the ancestral Ohlone had ample reason to engage in some level of warfare.

According to Keeley, raids and ambushes were the dominant form of warfare among pre-state societies, involvoing a small group of armed men entering the territiory of a competing group and kill one or more people on "an encounter basis or by means of some more elaborate ambush. Women and children have commonly been killed in such raids" (Keeley 1996:65). Warfare of this type produces a fairly high casualty rate as the effects of many small incidents accumulate over time, focuses on individuals in small isolated groups, and the types of wounds inflicted would be sustained as the victim tries to escape their attackers.

Bamforth (1994) examines archaeological and ethnographic data from several sites in the Great Plains region in order to correct misconceptions about pre-contact tribal warfare and to illuminate the role archaeological data can play in determining how contact altered existing life ways, specifically war. The sites examined were generally well excavated massacre sites occupied by sedentary agriculturalists. Archaeological data is useful for determining patterns of warfare but lacks the resolution to do more than make inferences about intensity. Given that the Larson site, a post contact settlement and Crow Creek, a

pre-contact settlement were both razed and their inhabitants massacred it seems that although the scale of warfare remained similar, but the intensity of the warfare is still not clear. How often these settlements were attacked and the intensity of the attacks remains unknown based on the available data.

Archaeological Studies of Warfare

In *Warfare in* Late *Prehistoric West Central Illinois* by Milner and others, the authors analyze a skeletal sample from the Norris Farm site in Illinois from the Oneota people. They study the kinds of injuries sustained, patterns of violence and hardship, disease and its affects on the community, general warfare patterns and how the Oneota coped with warfare. According to the authors there were two hundred sixty four (264) burials at Norris Farms and forty three (43) of them died violently. Obsidian biface trauma was prevalent, as well as depression fracture in the skull. Mutilation and scalping were perpetrated on the Oneota, as well as decapitation (Milner et al. 1991).

Of the 43 victims, forty one (41) were at least 15 years old at the time of death, 35% of the population could be determined as male and 29% could be called female. It is unlikely that all victims of warfare in this sample have signs of it on their bones. Bodies

missing crania are not classified as decapitation victims unless there are marks on the cervical vertebra. The authors suggest that all this indicated the Oneota lived in a state of constant, if sporadic, low intensity warfare that grew to be a source of disruption in essential community functions such as subsistence gathering and food processing. The funerary evidence supports this theory, since the attacks seem to be perpetrated on individuals and small groups. The culture of the Oneota is markedly different from Mississippian peoples who had previously lived in the area, with differences of pottery styles and other material culture. Their presence in the area may have been considered to be an intrusion into their territory by Mississippian peoples in the area. Although Mississippian sites are common in the area, Norris Farms seems to be the only Oneota settlement in the area. It is likely that this frontier boarder type settlement was the subject of the anonymity of the people they displaced. The long-term low intensity warfare was a direct result (Milner et al 1991).

War is a prevalent feature of human life and its causes are as complex as they are common. Ascribing warfare or interpersonal violence to strictly ecological or biological causes implies that human beings are simple biological machines executing a prewritten program. Prehistoric people in the SF Bay Area lived lives that were as interrelated and codependent as any modern person; this is the legacy of existing as an actor within a

social system. As Walker (2001) observes in his cross cultural survey of modern and prehistoric societies, modern people still live in danger of interpersonal violence or warfare and that this is part of the human condition rather than the result of any particular subsistence strategy, social construct, or biological determinant, although the expression of these types of behaviors are influenced by all of these.

In their analysis of mortuary treatment and perimortem modification of human bone on the northern Great Plains, Olsen and Shipman (1994) examine eighty five (85) cast replicas of bone surface from thirty eight (38) individuals. The authors explore three hypotheses; that inter tribal conflict increased with the in migration of the Arikara into what was traditionally Mandan territory, that the influx of Arikara peoples reduced the number of secondary internments, and that modifications to bone as part of mortuary treatment could be differentiated from deliberate traumatic injury.

By determining a pattern of injury to skeletal elements for mortuary treatments like defleshing and disarticulation (i.e. short fine cutmarks at muscle and ligament attachment sites) as well as intertribal conflict (i.e. cutmarks on the cranium indicative of scalping and mutilation and cutmarks resulting from projectiles and stabbing wounds), the authors were able to differentiate between the two causes for perimortem trauma. Their analysis indicates that there were two distinct patterns of cutmarks and that were identifiable as

secondary burial and an increase in intertribal warfare. These conclusions were based upon the patterns of cutmarks on individuals and which segments of the population were affected. The results reflected a decline in the rate of secondary burial and its pattern of defleshing and disarticulation marks and an increase in the incidence in deliberate traumatic injury due to violent encounters as the Mandan were gradually replaced by the Arikara. The authors suggest that males were more often affected by deliberate traumatic injury than females and that the complete recording of these burial data and types of lesions are a necessity in case of reburial.

Similarly, Smith (1997) in her examination of cutmarks and deliberate trauma in western Tennessee Valley suggests that the same type of differentiation can be made with skeletal populations from that region. The author states that little is known about the spatial and chronological distribution of intertribal violence beyond the Great Plains, and most of the literature deals with a few individuals from varying locations. The basic data dealing directly with the "origins and maintenance of war" is lacking (Smith 1997:242). The population she studies is an Archaic hunter-gatherer population from the Kentucky Lake Reservoir consisting of over six hundred (600) people from seven sites and provides early evidence of scalping in an early archaic context. The author states that warfare associated perimortem traumatic injury like cutmarks associated with scalping and trophy

taking are identifiable by a specific patterns of cutmarks, although secondary burial mortuary treatment introduces some ambiguity and offers a differential diagnosis to interpersonal violence.

Individuals with osteological evidence of inter-group violence were divided into two groups, one cohort with evidence of violent death (i.e. embedded projectiles, depression fractures ad cutmarks on the axial skeleton indicating stab wounds) and trophy taking (i.e. scalping and the retrieval of non-torso skeletal elements such as the distal limbs, mandible and crania). Smith (1997) states that the discrimination of cutmarks associated with inter-group deliberate trauma are identifiable by their similarity to "green bone" butchering cutmarks found on faunal samples from the area, and differ from mortuary treatment in their patterning on the skeleton. Dismemberment trophy taking can be identified in burials with undisturbed contexts by "circumferential cuts restricted to the proximal to a missing limb, adjacent to the joint" (Smith 1997:246). Smith agrees with Olsen and Shipman (1994) that a series of many short cutmarks serendipitously distributed around the skeleton are indicative of mortuary treatment rather than a violent encounter. The author states that cutmarks associated with flexing an individual for burial occur on the humerus, tibia and fibula. Evidence of violent trauma was observed on ten (10) individuals. None of these were blunt force trauma to the cranium. Six (6)

individuals presented embedded projectile points; two (2) individuals had evidence of cut marks indicating multiple stab wounds and the severing of the throat. The remaining three (3) had cutmarks indicative of trophy taking and scalping, although no other indications of violent death were observed. The author suggests that these are the earliest indications of trophy taking in the region. She goes on to state that without evidence of large scale massacre episodes such as Crow Creek (Wiley 1990), intertribal conflicts will likely appear only in a small percentage of individuals at any given site. According to the author, these results offer three (3) patterns of traumatic injury that provide directions for future research; the first is differential distribution of sites with perimortem violent trauma, the second effects hypotheses concerning the nature of warfare and social stratification, the third concerns the lack of blunt force cranial injuries among any of the study populations as opposed to many other site collections that have many examples of this type of injury. This regional perspective on the patterning of violent trauma provides the basis for hypotheses ranging from cultural complexity, resource scarcity and other materialistic models for the region.

In his analysis of the Santa Barbara Channel Islands, Walker (1989) analyses seven hundred forty four (744) crania and suggests explanations for the high rate of non-lethal depression fractures in a reportedly "peaceful" culture like the Chumash. Out of the total

sample of 744 crania, 19.3% had evidence of a depression fracture. These were centered mostly on the frontal area but also present on the parietals. Although females suffer these types of fractures as well, the fractures on male skulls are deeper. Although depression fractures are rare in individuals 15 years old or less, the rate of depression fractures increase into adulthood and declines in old age. Depression fractures were more common on the left side of the cranium than the right. There are a few suspected causes for these injuries; among them are interpersonal violence, accident and ceremonial self-mutilation injuries. Missionaries among the Guaicura Indians of Baja noted that those in mourning would "….beat their heads with pointed stones until blood flows down to their shoulders" (Walker 1989:320).

Accident is another cause of these kinds of cranial fractures. The evidence for accident is weak, citing the fact that in pre-industrial societies the survival of injuries to the occipital or parietal bones in unlikely, interpersonal conflict is more likely. A neighboring tribe to the Chumash, the Gabrielino, carried studded clubs as weapons. If the studs were less in length than the thickness of the skull, then these types of non-lethal depression fractures could be the result. It has been suggested that these fractures are not the result of an attack meant to kill but rather fighting intended to injure instead. The evidence for injuring rather than killing is a lack of skulls with fractures that expose the

brain to the environment, of which there was only one in the sample. Possible motivation for such fighting may be the constrictive environment of the Channel Islands. The Island ecosystem is small and subject to overexploitation. It is more than likely that the injuries are the result of conflicts over resources under these heightened circumstances. It is also apparent that the intensity of the conflict was relative to the changes in resource availability. Walker uses the following criteria to identify trauma: the absence of reactive bone or the callus that forms over a new break denoting healing, the lack of involvement of the rest of the skeleton as with a systemic infection, well delineated depression fractures, and the occasional retention of fracture lines associated with the depression fracture.

Walker (2001) calls attention to a disturbing trend in humankinds' somewhat violent past (as opposed to our somewhat violent present), and the correlation between climatic instability and outbreaks of relatively large violent conflict. The extent of conflict as a result of drought tends to be limited by the societies' ability to culturally buffer the effects of the drought. As the author observes, we are fortunate to live in a society where drought rarely affects the food supply. One only has to look as far as sub-Saharan Africa to observe what happens in societies without such capabilities. In the age of global warming and shifting climatological patterns these types of observation will become

increasingly important. As Walker points out, “dealing with the violent potential of such a worldwide climatic catastrophe is a challenge future generations surely will face” (Walker 2001:591).

Lambert’s *War and Peace on the Western Front* is a study of violence and warfare, with emphasis on the Santa Barbara Channel Islands. The author provides a survey of violent interactions with a temporal framework to facilitate interpretation. She considers parry fractures, cranial vault injures, and projectile point wounds as evidence for interpersonal conflict spanning 800 years in the Channel Islands. The primary focus of her research is to study the linkages between violence and resources on behavior both before and after contact (Lambert 1994). Her study finds that the Middle Period in the Santa Barbara Channel saw a marked increase in violent conflict that may be attributable to climactic fluctuations and resource instability. However, the author concludes that other factors influenced warfare and violence including increasing political complexity of Chumash chiefdoms and technological change such as the advent of the bow and arrow.

Lambert revisits the subject in her (1997) treatment of patterns of violence in southern California. The author states that while much of the knowledge we have pertaining to violence in ancient populations is based largely on ethnographic studies of modern non – industrial societies. This line of inquiry lacks the time depth required to understand long

term changes in patterns of violence in archaeological populations. To address this issue she uses evidence of interpersonal traumatic injury from the Santa Barbara Channel islands to illustrate changes in raters of interpersonal violence over time, and their relationships to climactic fluctuations. The population under study is an amalgam of 30 Channel Islands sites spanning the last 8600 years consisting of 1744 individuals. Lambert states that cranial vault fractures and projectile point wounds were investigated as examples of interpersonal violence.

In a population of 608 individuals that could be reliably aged and sexed (319 males and 289 females), males sustained more depressed cranial fractures than females, however the majority of male depression fractures were sustained on the fontal bone, while in the female population the lesions were more evenly spread across the cranium. The author suggests that the reason for this pattern is that males are more likely to sustain these types of injuries in face to face confrontations with other males while females were likely the victims of domestic abuse.

Lambert uses not only unambiguous embedded projectile point wounds but inferred wounds based on cutmarks on bone with projectile points in association as well as projectile points within the burial matrix so as not to underrepresent the rate of these types of injuries. The author states that 58 of 1744 individuals in her sample had

evidence of projectile point wounds. Lambert asserts that the rates of depression fractures and projectile point wounds escalate from the Early to Middle periods and decline from the Middle to Late periods as a response to unfavorable climatic conditions that were present in the Middle period.

In her synthesis of warfare in North America (Lambert 2002:209), Lambert defines warfare as "a state or period of armed hostility between politically autonomous communities". According to Lambert, the archaeological study of warfare is based upon four lines of inquiry: settlement data, iconography, weaponry, and injuries visible in human remains.

Settlement Patterns and Defensive Structures.

Settlement patterns for the ancestral Ohlone consisted of main villages or hamlets with smaller satellite settlements that were occupied during certain times of the year as resources became available seasonally (Levy 1978:491-492). Although the main villages generally had structures such as a long house, sweat house and individual dwellings, none exhibit anything that could be recognized as a defensive structure or palisade. At the time of contact, no mention of any fortifications that Europeans would recognize is mentioned in ethno historic accounts. The only structures built by the ancestral Ohlone that are archaeologically visible were the subterranean portion of long houses and the

living surfaces left from tule houses. If there were defensive structures in use, it is possible that they were not robust enough to be visible archaeologically (Lambert 2002).

Iconography and Weaponry.

Examples of Ohlone iconography are scarce aside from a few examples of rock art, the meaning of which is lost to us. Although some of these may in fact pertain to warfare in some respect, the knowledge of what the symbols mean and how they were interpreted by the Ohlone no longer exists. Weaponry used by the Ohlone and the Meganos would have been an atlatl or spear thrower and spear until the introduction of the bow and arrow at about AD 500. The types of points used varied by time period and type of game being pursued; however, it is reasonable to assume that projectile points manufactured for large game would be equally effective against an enemy.

Other archaeological evidence for warfare include the destruction and abandonment of a settlement (Wiley 1990, Lambert 2002), large concentrations of arrowheads (Fergeson 1997), or mass interments of the dead (Wiley 1990). The weapons that would be used in warfare by the Meganos or ancestral Ohlone are the same that would be used in hunting activities, all that would be required is a shift in targets. Osteology becomes the only realistic line of inquiry for studying warfare at the site.

Injuries in Human Skeletal Remains.

Osteological Evidence of Interpersonal Violence

Skeletal studies of violent conflict are valuable because they provide researchers with "a record of individual participants and unique events" (Lambert 1994:31). In some instances osteological data is the only data available and at CA-ALA-343 this is the case. While most studies of warfare depend upon site surveys to determine prehistoric behaviors, mortuary remains provide data on actual events, rather than inferences about possible violent conflict provided by other lines of inquiry (Lambert 1997).

Table 2. Types of Interpersonal Violence and Injuries.

Types of Interpersonal Violence	Types of Injury
Penetrating wounds	Projectile Point Wounds
Sharp Force	Cut Marks
Blunt force	Depressed Cranial Fractures

Blunt Force Trauma

Figure 2. Example of blunt force trauma, cranial comminuted and diastatic fracturing of Burial 01-005 CA-ALA-343. Photograph by Christine Marshall (Marshall 2002: 59).

Unambiguous blunt force trauma as it is seen in episodes of interpersonal violence generally takes the form of injury to the face and head. The head is a focal point during episodes of interpersonal violence since "it is a large immovable appendage that houses a

sensitive organ" (Lambert 1994:36). When struck with a blunt instrument the outer table of the affected bone compresses, while the inner table is placed under tension. If the force applied overcomes the bones ability to flex, it will suffer fracturing and deformation. Cranial depression fractures acquire their ellipsoid, sunken shape as a result of the inner table of the cranial bone fracturing in a conical shape, while the outer table will break in a concentric pattern (Boylston 2004:41).

Antemortem fractures are readily identified by their healing, the formation of callus of new bone and remains for some time after the injury. Fractures in living or recently dead bone versus old bone may be differentiated by the angle of breakage and texture as well as difference in color (Walker 2001).

Penetrating Wounds

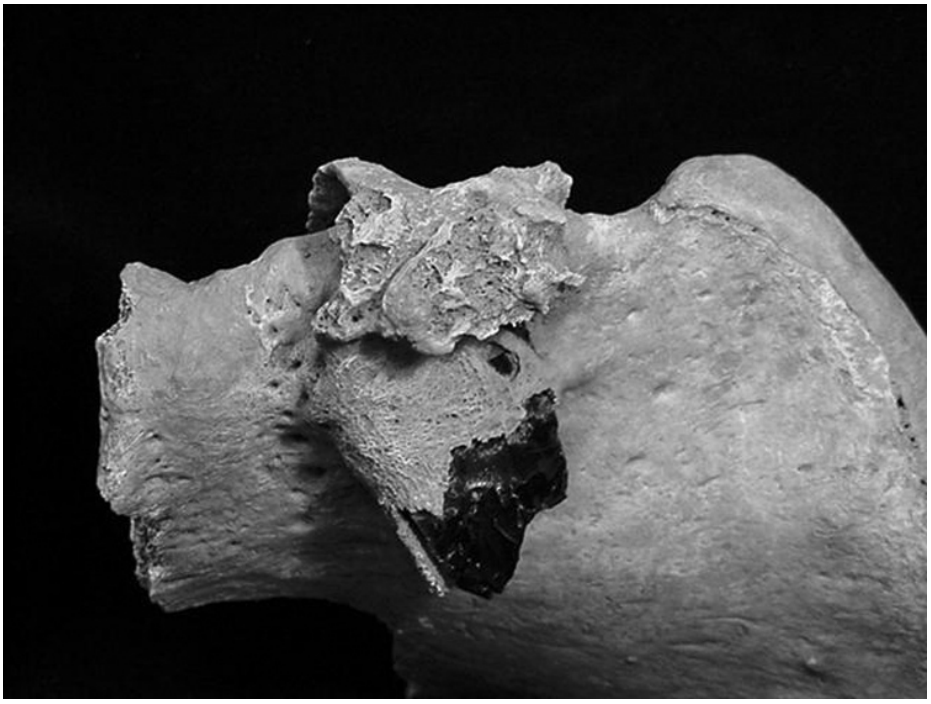

Figure 3. Posterior view of healed biface trauma to the left ilium of Burial 00-230, CA-ALA-343. Photograph by Christine Marshall (Marshall 2002: 57).

Projectile point injuries in human remains are one of the few definitive types of traumatic injury. They provide the archaeologist with what Lambert calls, "smoking gun evidence of lethal intent" (Lambert 1994:18). This type of wound includes both high velocity objects like arrows and slower objects such as thrusting spears. Projectile point

wounds feature in archaeological reports since they are hard to overlook if the projectile is embedded. Healed projectile point wounds are harder to recognize, but have been noted by other researchers in the SF Bay Area (Jurmain 1988). Characteristic features of projectile point wounds are internal beveling of the inner table and the projectile itself if present sharp force trauma by a stone tool (Olsen and Shipman 1994, Smith 1997). Since non-lethal projectile points are likely to be removed, samples of projectile point wound victims tend to be skewed to fatal injuries (Lambert 1994).

Lambert (1997:93) suggests only one (1) in four (4) projectile points wounds have hard tissue involvement, but as Jurmain states, adding such variables into bioarchaeological analyses make any conclusions “ambiguous at best” (Jurmain 2001:20).

Sharp Force Trauma

Figure 4. Sharp force trauma. Healed cutmarks (arrows) to the left side of the mandible of Burial 00-103, CA-ALA-343. Photograph by Christine Marshall (Marshall 2002: 55).

Much of the available lterature on deliberate trauma takes the form of studies on prehistoric warfare. Sharp force wounds are caused by edged or pointed weapons and the resulting injuries vary in form depending on the force applied and the position of the

skeletal element in relation to that force. If an edged weapon strikes perpendicular to the surface of the bone it may cut through cleanly, as seen with sword wounds, or it may leave a "V" shaped lesion that can sometimes be mistaken for rodent gnawing or some other taphonomic process (Olsen and Shipman 1994, Smith 1997). If the edged weapons strikes the surface of the bone at an oblique angle there may also be a flat polished cut surface and flaking on the acute side of the wound accompanying the "V" shaped lesion (Boylston 2004). These types of lesions are seen with stabbing and cutting episodes and may be related to scalping or trophy taking in SF Bay Area populations. Scalping was a common cultural feature of warfare throughout the world, and was common here in California (Heizer and Whipple 1971, Levy 1978). Examples of scalping can be found in all regions of the United States and in various time periods (Milner et al 1991, Wiley 1990, Strother 2003, Hamperl 1967, Marshall 2002). It is also possible that mortuary treatment such as flexing a body for burial if rigor mortis has set in, or ceremonial defleshing will leave marks indistinguishable from interpersonal violence (Smith 1997).

Articles on the osteology of two sites on in the Great Plains by Holliman and Owsley (Holliman and Owsley 1994) and Bovee and Owsley (Bovee and Owsley 1994) describe traumatic injury in detail. Scalping, mutilation and embedded projectile points are

undeniable evidence of deliberate trauma, suggesting that inter-tribal aggression was the rule rather than the exception.

Fractures

Figure 5. Non-union fractures of the left ulna and radius of Burial 00-103, CA-ALA-343. Photograph by Christine Marshall (Marshall 2002: 47).

Fractures are the most common form of pathological conditions found in the archaeological record (Roberts and Manchester 1999). Non-deliberate fractures are the

most common, and several researchers have delineated ways to determine whether or not a given fracture is intentional or otherwise (Staten and Arriaza 2000, Galloway 1999).

In their study of coastal populations of Chile, Staten and Arriaza (2000) looked at the patterns of injury within the population as well as the distribution of trauma throughout the population. They determined that a significant amount of the trauma seen in the population was deliberate. In his study of the Chumash of southern California, Walker found depression fractures in a Chumash population that were indicative of non-lethal, non-deliberate trauma, he established this by patterning the lesions and found that they were grouped predominantly on the left side of the cranium, where one would expect to be struck by a right handed assailant. He correlated this finding with the ethnographic record and found that the rate of interpersonal violence increased along with population pressures (Walker 1989).

Lovejoy and Heiple (1981) give direction on the quantitative analysis of long bone fractures. They hold that this type of data is valuable in interpreting the behaviors of past peoples, specifically whether the fracture was the result of accident of traumatic injury, the segment of a population most likely to be injured. In this analysis, they used the skeletal samples from the Libben site of Ottawa County in Ohio. The authors state that this kind of analysis has much to offer but it requires standardized methods, one that

could be applied across the board in all studies of this type throughout the discipline. They offer suggestions on some practical procedures that will allow us to draw reliable and meaningful data from traumatic lesions from a given skeletal population.

Dislocation

Dislocation defined as "a traumatic injury where there is loss of contact between two osseous surfaces which are normally a joint" (Roberts and Manchester 1999:87). These have a relatively low archaeological visibility since the bones need to be misaligned if they are to be recognized by the researcher. Jurmain's coverage of trauma at CA-SCL-038 includes one case of probable dislocation of the hip. The femoral head was misshapen and the muscle attachments on the greater trocanter were remodeled probably from a muscle pull (Jurmain 2001:17).

Other studies with Archaeological Evidence of Deliberate Trauma in California

Although the study of interpersonal violence and warfare has become popular in California archaeology relatively recently, instances of deliberate trauma have been noted in archaeological remains from California sites for some time. Pastron (1973) summarized sixteen (16) such individual cases of deliberate trauma in *Aboriginal Warfare in Northern California*. From these examples, the author recognizes several general patterns in native California conflicts. Based on the sixteen individuals reported

on Pastron states that traumatic injury of this type is more common in males than females, but females were not exempt from violent encounters. The sample was also predominately adult, between the ages of the early twenties to middle forties based on osteological assessments. All of the study population had projectile points embedded in a skeletal element and were generally shot in the back. It is the author's contention that although ethnographic data on warfare in California is in short supply, archaeology may provide opportunities to study warfare and its causes, as well as consequences.

Tenney (1989) noted blunt and sharp force trauma, projectile wounds, fractures and dislocations in his survey of a skeletal population of two thousand one hundred eighty (n=2180) individuals from the Lowie Museum at University of California at Berkeley. The author describes ninety one (91) individuals with "parry" fractures, nine (9) individuals with healed depression fractures, two (2) individuals exhibiting hip disclocations, and thirteen (13) individuals with projectile point wounds. Based on these findings the author suggests that traumatic injury, both deliberate and non-deliberate were a realitively common occurrence in prehistoric California.

In their 2010 article *Trophy Taking and Dismemberment as Warfare Strategies in Prehistoric Central California,* Andrushko and others use a database created by Schwitalla containing thirteen thousand four hundred fifty three (n=13,453) individuals to

discuss trends in types and rates of dismemberment and trophy taking in prehistoric California. A total of seventy six (76) individuals out of the total population had evidence of perimortem removal of skeletal elements or .006% of the population. The database consists of burial data for individuals spanning California from the Early Period (3000-500 BC) to the Late Period (AD 900-1700). This group tended to be male and have other evidence to traumatic injury, as well as non-normative burial treatments in the form of inclusion in multiple burial contexts. The authors state that the Middle to Late Transition Period (500-200 BC) showed a marked increase in trophy taking and artifacts made from human bone that date to this period suggest that trophies became status markers in an increasingly complex social system that developed during this period. The authors suggest that the taking of trophies was also linked to a "rigid ethnic identity" maintained by tribelet sized groups in Central California and the ability to dehumanize individuals from another group; to the point of being able to butcher them like an animal was a necessary feature of intergroup dynamics in this area, especially during the Middle to Late Transition Period (Andrushko et al 2010:11).

Andruschko and others study trophy taking and dismemberment as a strategy of warfare in California of osteological and archaeological data for 13453 individuals drawn from the length of California and a span of over 5000 years. The authors state that

dismemberment and trophy taking is a world wide phenomena. Trophy taking serves as proof of a successful battle and dismemberment as a symbol of defeat to survivors. The authors state that dismembering and trophy taking differ in that dismemberment involves leaving severed elements with the corpse while trophy taking involves the curation of elements for later display. The authors state that dismemberment has been documented in central California only as decapitation. The taking of long bones as trophies began to be documented only recently, beginning with CA-SCL-674, the Rubino site in San Jose California.

Archaeological Evidence of Deliberate Trauma in the SF Bay Area.

Although instances of interpersonal violence have been known in the archaeological record in the SF Bay Area since at least the 1960's (Keeley 1996). Until the late 1980's, the focus of most archaeological inquiry in the SF Bay Area was focused on artifact types, chronological studies, and site formation processes rather than any serious osteological study. Human internments were seen more as a liability or a nuisance rather than a valuable source of archaeological information. Since the 1970's, there have been several studies featuring examples interpersonal violence or warfare in the SF Bay Area.

CA-SCL-674

CA-SCL-674 was excavated in 1998 by Archeo-Tec, a local CRM firm. In the study by Grady and others (Grady et al 2001) on the Rubino site (CA-SCL-674) evidence of deliberate traumatic injury reports that out of a total population of two hundred twenty four (n=224) individuals, of the population showed evidence of deliberate traumatic injury. Grady and others report that out of a total population of 224 individuals, sixty four (64) or 28% of the population showed evidence of traumatic injury. For the population from CA-SCL-674 contained twelve (12) victims of trophy taking, who were missing their radii and ulnae and whose distal humeri show perimortem cut marks. Healed depression fractures and perimortem cranial fractures were also observed. Two individuals had unambiguous projectile point injuries. At CA-SCL-674, artifacts made of human bone were recovered, including two (2) ulnae and four (4) radii with modified drill holes, polishing and cut marks.

CA-CCO-474/H

The Master's Thesis by Strother (2003) details the osteological analysis of a skeletal population representing one hundred thirteen (n=113) individuals from CA-CCO-474/H. The site was excavated by the local Cultural Resource Management (CRM) firm William Self Associates (WSA) (Estes et al 2002) and is described as a Middle Period habitation

located in Hercules, California on the site of the historic Hercules Powder Works. Strother found seven (7) individuals who had suffered deliberate traumatic injury. Of these, four (4) had healed depression fractures and three (3) individuals bore perimortem cut marks suggesting violent trauma.

CA-ALA-413

Randall Wiberg's Master's Thesis centers on the excavations at CA-ALA-413, a site excavated by Holman and Associates in 1979 (Wiberg 1984). In his efforts to identify evidence for the Meganos intrusion into the area and answer questions about social ranking at CA-ALA-413, Wiberg found individuals with inferred deliberate traumatic injury, a total of three (3) out of sixty four (n=64) individuals had evidence of traumatic injury. One young male (Burial 33) had three (3) projectile points in his rib cage area, through without any hard tissue involvement. Another (Burial 11), was missing its crania and part of its scapula, and the third individual (Burial 44) had a broken projectile point in his chest cavity and was buried in a dorsal extension. Although these are not direct cases of traumatic injury they do beg questions about interpersonal violence at the site.

CA-ALA-613

The Canyon Oaks site was analyzed by Pilloud (2003) to determine whether general health in the Middle to Late Transition and Late Period suffered due to the effects of the Medieval Climactic Anomaly (MCA). The study population consisted of 98 individuals, excavated by WSA in 2002, who could be reliable aged, sexed and dated. Genreal health was accessed through stature and enamel hypoplasias. Her Master's Thesis results indicate only a small increase in makers of nutritional and metabolic stress such as *cribra orbitalia*, and interpersonal violence were found during the MCA. A shift away from a marine and lacustrine diet towards a diet based on terrestrial resources was iducated during the MCA with a shift back to towards lacustrine and marine resources after the termination of the MCA is indicated for females, while males showed an increased reliance on marine resources that continued to intensify after the end of the MCA. There were a total of 11 insatnces of interpersonal violence out of the sutudy population of 98 individuals (11%). A total of 15 extended and semi extended burials were recovered form the site.

CA-SCL-478

CA-SCL-478 is an archaeological site located in northern Santa Clara Valley, east of San Jose National Airport and comprises some 14 acres. The site is within ancestral Ohlone territory, but does display evidence of the Meganos Aspect in the form of extended burials. However, relatively few burial associated artifacts were found. A total of ninety (n=90) burials were excavated at CA-SCL478, with many examples of dismemberment, interpersonal violence and "non-formal" burial positions (Wiberg 2002).

Although no laboratory analysis was carried out, extensive field observations were collected. No grave markers of cemetery stratification were observed. Seventy seven (77) of the 90 individuals were from single internments, while ten (10) individuals were in double burials and one (1) triple burial was also noted. Wiberg notes the difficulty in comparing burial populations from other sites due to a great variety in the descriptions terminology for burial positions and their lack of adequate definition (Wiberg 2002:10-21). Wiberg states that of the thirteen (13) individuals buried in double or triple interments, nine individuals were adolescent or young adult males with either perimortem cutmarks denoting dismemberment (trophy taking) or projectile points with basal damage (indicating they had been used) in association. These are taken, along with the non-

normative burial treatment, to be indications of "conflict resolution and participation in ceremonies carried out to aquire trophy limbs" (Wiberg 2002:10-8).

Evidence of dismemberment included cut and chop marks on the distal humeri (Burials 37, 61, 62, 84), cut and chop marks on the distal femur (Burials 61, 71, 72), and the lack of associated elements. Burials 26, 33, 37, 47, 61, 62, 71 and 72 were found to have either unambiguous projectile point injuries or projectile points in association suggestive of interpersonal violence. Burials 70 and 71 have evidence of a healed depression fractures of the skull while Burial 71 also had perimortem fractures as well (Wiberg 2002:10-10 to 10-20).

CA-ALA-328

In his Master's Thesis, Ryan examined a skeletal population of four hundred fifty (n=450) individuals excavated at CA-ALA-328 by SFSU in the 1960's (Ryan 1972). Ryan found evidence of deliberate traumatic injury. Four (4) individuals of both sexes showed evidence of depression fractures of the cranial vault. The author also noted fourteen (14) individuals with parrying fractures and one individual, a 40-50 year old male, had a projectile point embedded in a rib. Although the parrying fractures could be attributable to non-intentional trauma, the projectile point is unambiguous.

CA-ALA-329

In 1991, Jurmain studied the Ohlone population at CA-ALA-329, a shell mound at Coyote Hills Regional Park in Newark California. During the 1960's, Stanford and SJSU conducted excavations on 20 – 25% of the shell mound, retrieving four hundred fourty 440 burials. Of these, two hundred forty eight (248) have been aged and sexed. These provide the basis for Jurmain's *Paleoepidemiology of Trauma in a Prehistoric Central California Population*. Using gross macroscopic examination along with x-ray and CT scans that author uses a methodology similar to Lovejoy and Heiple (1981) to categorize the bones and seriate them by side and injury. It is interesting to note that Jurmain had his CT and radiographic findings on skeletal trauma corroborated by an orthopedic surgeon. The author concludes that the population of CA-ALA-329 is "… perhaps the single most affected group with this type of deliberately induced lesion" and that "Interpersonal violence is apparently frequent, deliberate and often fatal" (Jurmain 1991:247). The author states that out of 2047 intact bones, only 36 have fractures (1.8%), with 4 cases of non-union and one case of carpal fusion due to falls. There are also 10 cases of obsidian biface trauma and three cases of hip dislocation. The same population was studied by McKale (1999) who found indicators of metabolic and nutritional stress. The author concluded that the population did show signs of increased

stress and pathologcal considitons, brought on by an increase in population growth and settlement density.

Differentiating between Trauma vs. Taphonomic Processes

Begun as a concern of paleontologists, taphonomy is the study of the way in which remains degrade and pass back into the environment. Archaeologists became interested in the way environment affected cultural materials. Several biological and geological processes can mimic traumatic injury in archaeological collections. Among these are biological processes like rodent gnawing, trampling, root damage and geological processes like mineralization, crushing, water transport, weathering, and other diagenic changes that may occur within the burial matrix.

As the environment in the vicinity lacks many of the culprits in the degradation of bone (i.e. soil freezing, volcanic activity etc.), most of the taphonomic processes that effect the osseous material in the CA-ALA-343 collection are biotic ones, rodent gnawing and damage from the acids associated with plant roots (White and Folkens 1991). Other factors effecting the condition of this collection include plow marks and breaks from agricultural activity, and damage from heavy equipment since many of the internments were discovered related to trenching, grading and roadwork. Taphonomic

data was recorded during the data collection carried out on this collection in terms of color, staining, cultural modifications, weathering, surface or contour changes and excavation damage (after Marshall 2002).

A variety of taphonomic alterations that affects bone may be mistaken for traumatic injury. Changes in color may be caused by chemical reactions with soil constituents or grave inclusions, burning of the grave pit or cremation. Changes in bone surface may be caused by chemical reaction with soil or grave inclusions, biotic factors such as rodent or scavenger/carnivore gnawing, insect infestations and root damage, and weathering due to exposure to the elements. Surface damage may also be caused by other post depositional factors such as trowel and dental pick marks sustained during excavation. Changes in shape may be caused by dehydration, salt accumulation, heat, scavengers, ground or ice pressure, excavation damage, and, most importantly in this collection, damage caused by construction or farm machinery (Buikstra and Ubelaker 1994, Haglund and Sorg 2002).

Differentiating Between Deliberate and Non-deliberate Traumas

When working with archaeological samples the researcher has several disadantages he or she must deal with. Archaeological samples generally include only the hard tissue, the soft tissue having degraded long ago. Traumas that may have been lethal that occurred to the soft tissue are of unobservable. Although there is a great deal of skeletal data

published concerning traumatic injury, much of it is inaccessible, published in hard to find sources such as “archaeology contract reports, and long forgotten monographs and articles” (Larsen 1997). The apparent lack of publication by archaeologists and osteologists is a widely known problem within the discipline. Archaeological preservation also works against the researcher. The population represented by the sample may or may not reflect the true population. For example, males may be buried while females may be cremated. Burial may be accorded only to those of higher status and so on.

Cannibalism

Some of the most valuable studies focus on the cannibalism, its archaeological requirements and taphonomic signature as it relates to its identification. Due to the highly charged nature of the topic, the standard of evidence is particularly high. This has resulted in very meticulous methodology that has utility for those studying interpersonal trauma in general, especially in terms of the recording of cut marks and fractures (White 1992, Hurlbut 2000).

Hurlbut (2000) deals with the "anthropogenic bone modification" in the Chaco culture area in the four corners region. The author characterizes Chacoan sites as having multi story pueblos, great kivas, ceramics, irrigation and road systems. Several of these sites in

the four corner areas have deposits of "scattered, broken, cut and burned human bone". Normally, the Anasazi buried their dead in a flexed or extended position, but deposits like those previously described are thought to be of either cannibalism, or witch execution (Hurlbut, 2000:19). It is the authors intent to differentiate between the two using taphonomy. Other researchers suggest that this kind of processing may be part of an unknown religious rite (Hurlbut 2000:4).

Hurlbut defines the taphonomic 'signature" of cannibalism, which she describes as perimortem breakage, anvil abrasions, burning, under representation of vertebra, and pot polish. Interpretation of these signature features is important, but just as important is the order in which they took place. Hurlbut also takes up a discussion of taphonomic processes that resemble cannibalism but are not. She begins with Anasazi butchering and food processing practices to compare them to the way in which skeletal samples suspected of being victims of cannibalism are processed.

Kroeber (1925:469) suggests that cannibalism may be a ritual part of warfare in the Ohlone region. However, since pot polish is unlikely to be found in the SF Bay Area, since it lacks a ceramic industry, ritual cannibalism will likely only be a theoretical concept.

MATERIALS

The Ohlone

The Ohlone of the SF Bay Area lived from the Carquinez Strait in the North to the drainage for the Carmel, Sur and Salinas rivers in the South. At the time of contact with Europeans, their society was composed thirty-nine (39) tribelets, each with a membership of around fifty to two hundred (50-200) individuals. Estimates for Ohlone populations at contact (1776) range from seven to ten thousand (7000 to 10200) (Kroeber 1925:464, Levy 1978:485).

Each tribelet had a chief and an elder council; however, the leaders were only able to exert authority over individuals during extreme emergencies such as warfare or fire. The Ohlone had no unified political organization. The basic political unit was the "tribelet". Each tribelet consisted of one or more villages and several camps within a given territory (Levy 1978:247). This type of political structure is thought to be the dominant type in California prehistory (Kroeber 1965).

Although all of the tribelets shared a similar political structure, the peoples known collectively as Ohlones were not politically affiliated. Trade was carried out with other tribelets as well as the Coast and Plains Miwok and the Yokuts. Obsidian for tools and

pinyon nuts were some of the items they traded for. In return they traded salt, *Olivella* beads, ochre and other exotics (Davis 1971). The Ohlone spoke in eight distinct languages, all derived from Hokan, accepting some loan words from neighboring tribes. All of these languages were thought to have died out by 1935 (Levy 1978:488). Kroeber (1925:37) states that cremation was the primary mode of funerary treatment, and was carried out in or near the village. The Ohlones were hunter/gatherers and migrated along a seasonal round, which originated at a winter village. As the seasons changed, a tribelet would split up into smaller groups to take advantage of available resources. Tidal marshes provided access to many different resources. Tules were gathered and used for boats. Reeds were used to make clothing, cordage, and housing. A huge variety of animals could be obtained from the bay and tidal mudflats as well as the sloughs and brackish marshland. Mollusks such as California Horn snail (*Cerithidia californica*), bay mussel (*Mylitus edulis*), oyster (*Ostrea lurida*) and clams (*Macoma nasuta*, *Macoma secta*) were collected. Many species of geese and ducks (*Anseriformes* sp.) were exploited as well. Fish species included in local archaeofaunal collections include sturgeon (*Acipenser* sp.), sharks (*Triakis* sp.), rays (*Mylobatis* sp.) and others. Marine and terrestrial mammals were also abundant in the tidal marshes. Species include elk

(*Cervus* sp.), deer (*Odecoilus hemoionus*), sea otters (*Enhydra lutris*), and sea lion (*Phoca vitulina*) (Hylkema 2002).

In the oak woodland and grasslands many resources were also available. Chief among these was the acorn as well as the buckeye. The large stands of oak trees acorns created a readily accessible staple. These could be stored in granaries and used through the winter months. Controlled burning was employed to promote the growth of acorns as well as seed bearing plants, and also helped prevent wild fires. Many mammals were hunted in the ecological zone such as elk (*Cervus* sp.), deer (*Odecoilus hemoionus*) and antelope (*Antilcapra americana*), rabbit (*Lepus californicus*), and racoons (*Procyon lotor*) and may others. The oak forest and grasslands were cut through with riparian corridors as streams and creeks from the mountains wound their way to the San Francisco Bay and become lost in the sloughs of the tidal march. These provided water of course, as well as freshwater fish and mussels and waterfowl (Hylkema 2002).

The Ancestral Ohlone

The people who lived in the SF Bay Area in the Early and Middle Periods are assumed to be the ancestors of the Ohlone (Moratto 2004). The ancestral Ohlone followed the Berkeley Pattern, as discussed in the introduction section of this paper.

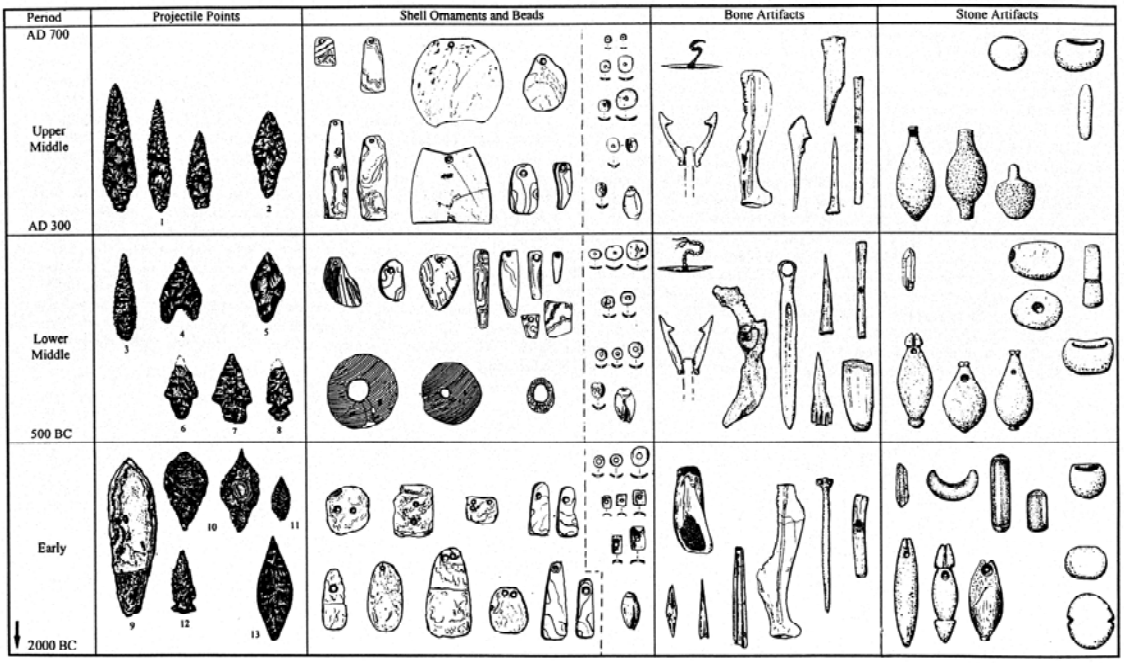

Figure 6. Berkeley Pattern artifacts (Hylkema 2002:246).

The Meganos

Archaeological evidence suggests that as the Meganos moved south and west during the Middle Period, the ancestral Ohlone were displaced from their former territory. There is no ethnographic data on the Meganos. The artifact suite for the Meganos Pattern further described here as observed at CA-ALA-343 (Hylkema 2002:248), includes shield shaped *Haliotis* sp. (abalone) pendants, bone spatulates or wands, G type *Olivella* sp. (olive shell) beads, and bird bone whistles.

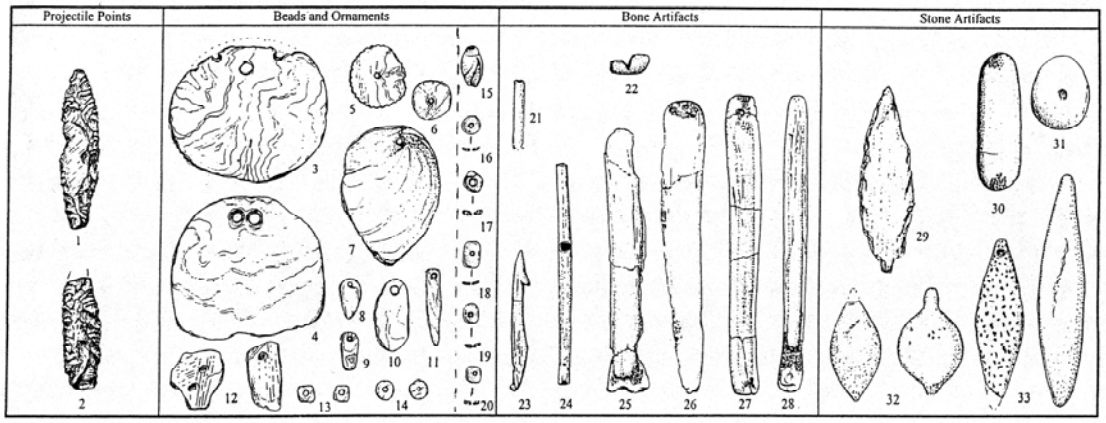

Figure 7. Meganos artifacts from CA-ALA-343 (Hylkema 2002:248).

CA-ALA-343

CA-ALA-343 is located at the corner of modern Civic Center Drive and Walnut Avenue in Fremont California. CA-ALA-343, also known as Stiver's Lagoon, is situated between the foot of the Diablo Mountain range and the tidal marshes of the San Francisco Bay. People who were living in such an area would be able to exploit resources from the tidal marshes that ringed southern San Francisco Bay as well as the grassland and oak woodland that lead away east towards the Diablo Mountains.

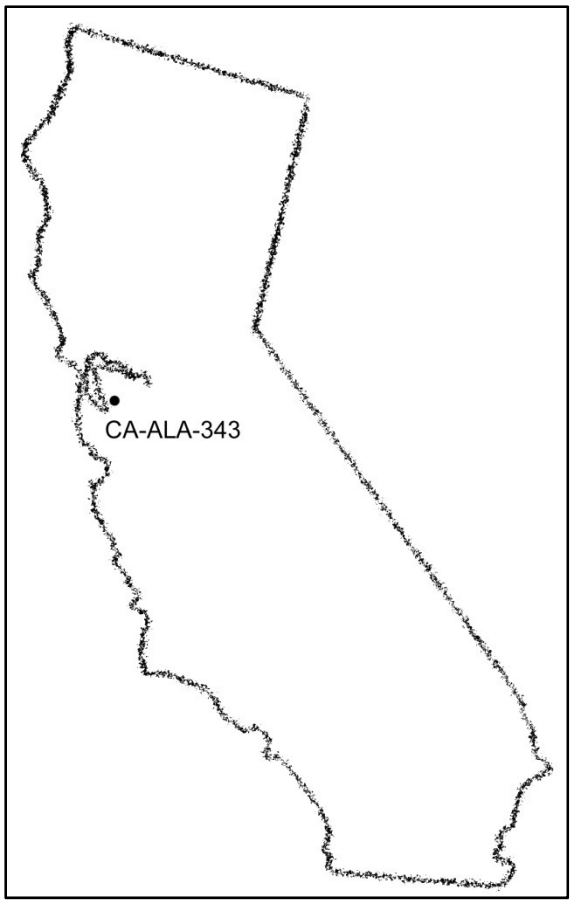

Figure 8. Outline of California showing location of archaeological site CA-ALA-343.

The site is unique as it exhibits the characteristic artifact and burial customs of the Meganos Aspect, as well as those of the ancestral Ohlone who were indigenous to the area. CA-ALA-343 is described in the literature (Wildesen 1968, Parkman 1980, Hall 1985) as a village site with an associated mortuary complex. However, based on field

observations during the Archaeor excavations in 1999-2001, there is very little residential midden associated with the large number of individuals interred there. CA-ALA-343 is reported to be a Middle Period site with at least two periods of occupation (Parkman 1980).

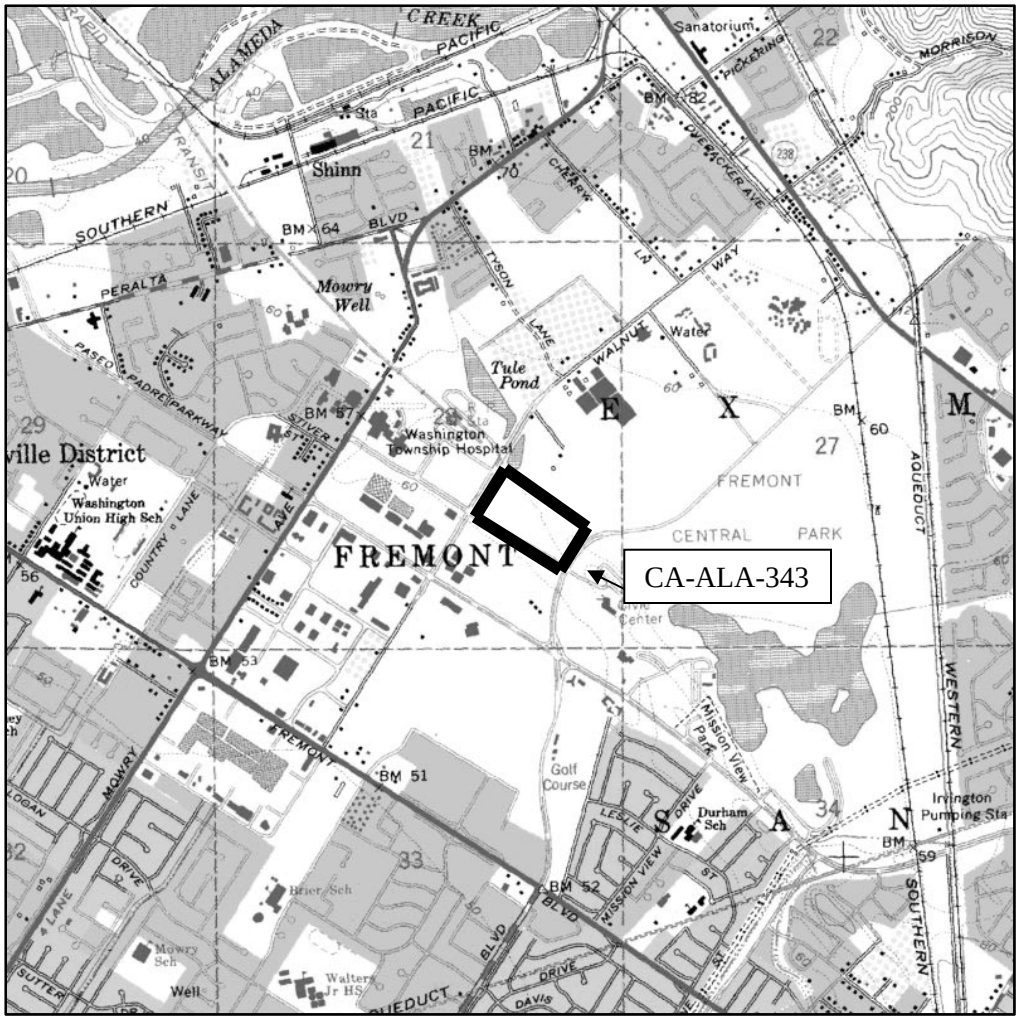

Figure 9. Niles 7.5 Quadrangle (1:24,000) with proposed site boundary. United States Geological Survey (USGS 1968).

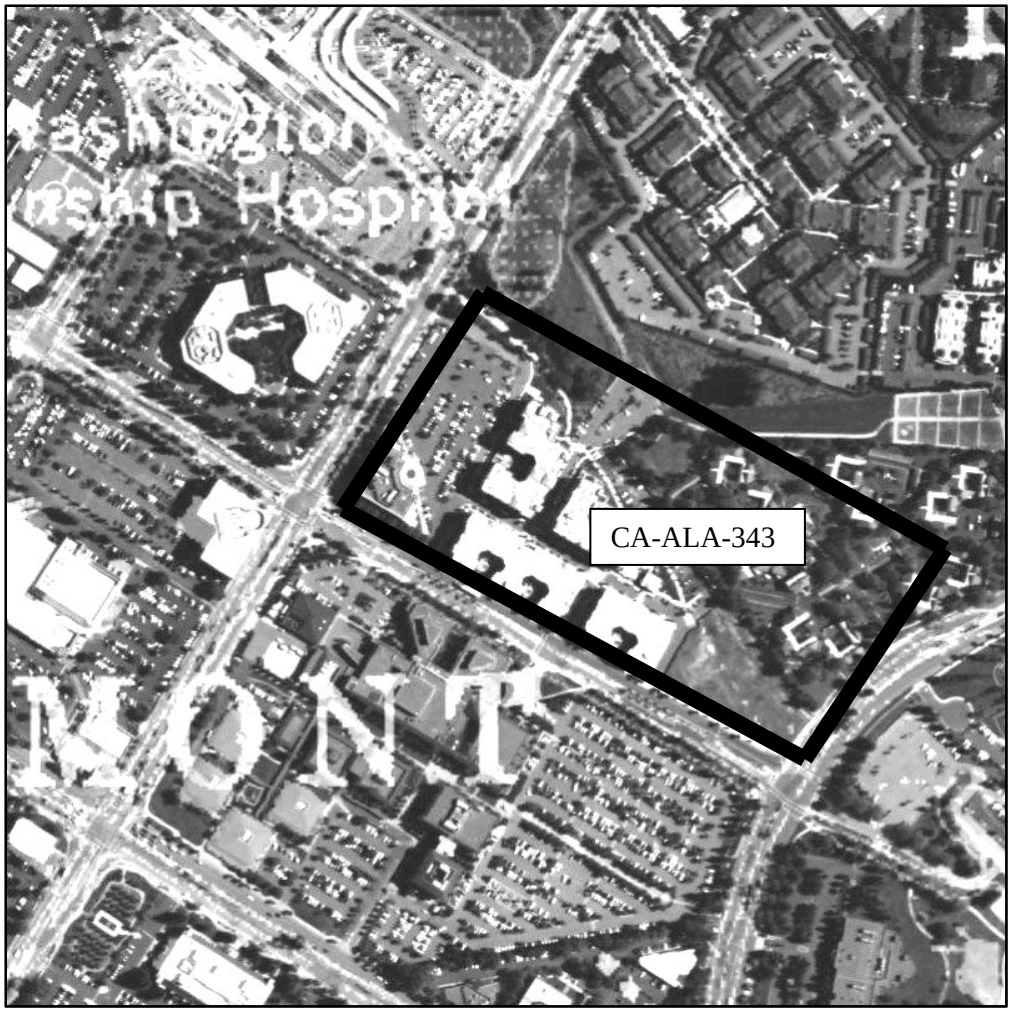

Figure 10. Aerial and topographic hybrid map of CA-ALA-343 after construction in 2000-2001 with proposed site boundary (Mapcard 2009).

Based on the dates in the following table, CA-ALA-343 was utilized for a long period of time 1570 BC to 798 AD. Additionally, several Venetian glass trade beads were

recovered from a test unit by Holman and Associates (1996). Milliken, after examining the F series beads found by SJSU in 1985, concluded that they dated to 500 - 800 AD (Hall et al 1988). This was later confirmed by Groza (2006). Other *Olivella* bead types found at CA-ALA-343, such as G series (Hall et al 1988, Thompson 2005) confirm the site use during the Middle Period.

Table 3. Dates for CA-ALA-343.

Date	Source	Report
1370 BC(+/-200)	Charcoal (Carbon)	(Holman and Associates 1996)
1700 BC (+/-200)	Charcoal (Carbon)	(Holman and Associates 1996)
830 BC (+/-180)	Charcoal (Carbon)	(Holman and Associates 1996)
540 BC(+/-200)	Charcoal (Carbon)	(Holman and Associates 1996)
333 BC	obsidian hydration	(Thompson 2005)
330 BC (+/-170)	Charcoal (Carbon)	(Holman and Associates 1996)
639 AD	AMS olivella F3a bead	(Thompson 2005) (Groza 2006)
703 AD	AMS olivella F3a bead	(Thompson 2005) (Groza 2006)
770 AD	AMS olivella F3b bead	(Thompson 2005) (Groza 2006)
798 AD	obsidian hydration	(Thompson 2005)

Previous Research at CA-ALA-343.

King recorded the site in 1968 and reported a midden that had been scattered over a wide area due to farming activities and that human remains were present. Although several testing programs and excavations were carried out on the site, no in-depth report has yet been written. In the fall of 1975, an Ohlone Community College archaeology field class taught by Rosensen spent several hours on a surface survey at CA-ALA-343. The class found shell, bone and worked stone artifacts (Chavez 1974).

Existing documentation includes a preliminary report by Wildesen (1968) on the SFSU excavation in 1968, two reports on a testing programs carried out by Archaeological Resource Services (ARS) in 1981 and 1994, preliminary reports on testing and burial excavation performed by SJSU in 1985 and 1988, and a report on the results of a testing program done by Holman and Associates in 1990. Other unpublished data includes excavation and burial data from the 1988 SJSU excavation (Hylkema 2006), unpublished illustrations, and an unpublished analysis of the burials excavated in 2000 from Archaeor (Thompson 2005, Marshall 2002).

There have been several testing programs and excavations carried out at CA-ALA-343, however, no in-depth report has yet been written. Excavations carried out at CA-ALA-343 over the last 50 years include a SFSU excavation in 1968, two testing programs carried out by Archaeological Resource Services (ARS) in 1981 and 1994, testing and burial excavation performed by SJSU in 1985 and 1988, and a testing program done by Holman and Associates in 1990. Other unpublished data includes data from the 1988 SJSU excavation and an unpublished analysis of the burials excavated by Archaeor in 2000 and 2001 (Marshall 2002).

The Study Population

The population analyzed by me for this study was excavated from CA-ALA-343 in 1968 by SFSU under the direction of Leslie Wildesen and 1974 by SFSU field crews and is housed in the SFSU Native American Graves Protection and Repatriation Act (NAGPRA) collection. The collection contains 33 individuals. A preliminary report on the project is available and briefly describes 7 burials (Wildesen 1968:np), although the map refers to 8 burials. The final report, cited by both Wildesen (1970) and Chavez (1974), could not be located within the Treganza Museum's collections. Wildesen states in her MA Thesis that a total of 12 individuals were excavated by her field crew in 1968 (Wildesen 1970).

It is known that the 1968 excavations produced, according to available records, eight discrete burials salvaged from an adjacent road construction project. It seemed unlikely that the testing program could have produced human remains representing the thirty three individuals present in the collection at SFSU. Further research indicated that the disparity between Wildesen's reported population and the actual minimum number of individuals (MNI) is due to additional emergency excavations carried out by SFSU archeologists Polly Bickel and James Dota in 1974 after burials were uncovered by a research team from the SFSU geology department studying the Stiver's Lagoon/CA-

ALA-343 area (Chavez 1974). According to Chavez's report, an additional 12 interments were recovered by Bickel and Dota (Chavez 1974). This additional salvage excavation would seem to account for the additional individuals in the CA-ALA-343 collection, assuming that both the 1968 and 1974 excavations recovered isolated human bone along with discrete burials.

The SFSU population from CA-ALA-343, housed by SFSU's Native American Graves and Repatriation Act (hereafter NAGPRA) program has been somewhat enigmatic due to the absence of most documentation. The collection of human remains was reexamined, as well as all faunal material to cull any human bone material and add any data gathered to this study, as well as to update the NAGPRA inventory. Although it is separated into "burial lots" in the NAGPRA inventory each lot has a variable amount of skeletal material. Conversely, an individual may be separated into several "burial lots" by element for the purposes of NAGPRA inventory. This may also attributable to the fact that only some of the burials collected were excavated by the archaeological crew, the rest were partly looted by local collectors or by the construction crew who disturbed them. The construction crew also reported other burials that went unrecovered due to looting (Wildesen 1968). The other two skeletal samples from the site are unavailable for

study as they have been reinterred, so this study will rely on the observations of other researchers for data.

According to the field catalog for the SFSU 1968 excavation material was taken from at least archaeological test units and from surface collections. Wildesen explained in a personal communication that the reason the materials were in such disarray could have been that,

> "…we arrived one weekend to find the lab tent totally flooded from the rain, I have photos somewhere of that fiasco. All the paper bags, with their labels, all the soil samples, and all the notes to date disintegrated." (Wildesen, personal communication 2006)

The fragmentary nature of the sample and its documentation has placed constraints on the type of data available from these samples. The use of the vicinity of CA-ALA-343 as an agricultural field for the bulk of the 20th century has resulted in a population in which only the most obvious traumatic lesions will be observable in most cases. The lack of burial proveniences for the SFSU collection will impair any spatial analysis that might have been otherwise possible.

Osteological Studies for CA-ALA-343

The excavations conducted in 1968 (SFSU), 1988 (SJSU) and 2000 – 2001 (Archaeor) all produced skeletal populations that were studied by the SFSU NAGPRA department, Jurmain (1988) and Marshall (2002) respectively.

San Jose State University (SJSU)

SJSU carried out a testing program at CA-ALA-343 in 1985, as well as emergency burial removal during the construction of the office building that stands at the corner of Walnut Avenue and Civic Center Drive. Unfortunately, the primary investigators notes from the 1988 excavation are not available, although burial and artifact drawings were provided by Hylkema in 2006. After their excavation was completed, the SJSU skeletal collection was analyzed by Dr. Robert Jurmain of SJSU in 1988. Information regarding age, sex, completeness, preservation, paleodemography, and pathologies were collected. There were seventy one (71) grave lots containing a minimum number of individuals (MNI) of seventy five (75). After analysis, these 75 individuals were reinterred nearby.

Jurmain characterized the remains overall as “fragmentary and very incomplete” (Jurmain 1988:1). A total of eighteen (18) individuals were sexed with some degree of certainty, while another nineteen (19) were seen as possibly male or female. Age at death was estimated for sixty nine (69) individuals. A total of six (6) individuals were

determined to show evidence of traumatic lesions. Of these, only two were deemed to be deliberate traumatic injuries indicative of interpersonal violence: an embedded projectile point wound (Burial 13) and (Burial 42) an un-united parrying fracture of both the left radius and ulna (Jurmian 1988). Jurmain observed that only 14 subadults were present in the collection, or 20% of the population, which he described as low.

Archaeor

In 2000-2001, another emergency burial removal project was carried out by Archaeor, a local Cultural Resource Management (CRM) company, due to the construction of a live/work development at CA-ALA-343. The individuals excavated by Archaeor were analyzed by Christine Marshall, M.S. (Marshall 2002). These individuals were reinterred at the Ohlone Cemetery in Fremont in 2003. Data regarding age, sex, completeness, taphonomy, paleopathology and non-metric traits was collected for this sample by Marshall (2002).

A total of three hundred eleven (311) individuals were actually discovered during the excavation. However, thirty (30) individuals were reentered with out analysis at the request of the Most Likely Descendant (MLD) for that parcel and were not available for study. The population studied is comprised of two hundred eighty one (281) individuals, including seventy three (73) males/probable males and seventy one (71) females/probable

females. One hundred twenty seven (127) individuals were classified as indeterminate adult, lacking sexually diagnostic criteria for sexing due to poor preservation and excavation (heavy machinery) damage. A total of fifty four (54) subadults were recovered, though this is less than would be expected in a prehistoric population. Marshall notes that the condition of the remains overall was poor due to extensive use of the area for agricultural purposes over most of the twentieth century (Marshall 2002).

San Francisco State University (SFSU)

In 1997, the SFSU NAGPRA program inventoried the CA-ALA-343 collection in order to comply with the 1990 legislation. London and Lopez determined age and sex and minimum number of individuals (MNI). They arrived at a MNI of thirty one (31), proveniencing them as well as existing documentation allowed (Fentress et al 1999).

An additional previously unknown box labeled “faunal bone” was discovered in 2004. This material was examined by myself. All intermixed human remains were assessed for age and sex as well as their disacticulated state allowed and matched to the previous collection. This resulted in another two individuals: a vertebral body belonging to an infant and a radius from a child aged 2-4 years.

METHODS

For the purposes of this thesis, minimum number of individuals (MNI), age and sex information for part of the SFSU population were collected. Observations on traumatic injury were also collected for the whole SFSU population. The established age, sex and MNI data from the original SFSU NAGPRA inventory were used for the thirty one (31) known individuals. The age and sex for human remains culled from faunal material were estimated using the methods below. Also in this section are the methods for the observation and analysis of traumatic injury, the amalgamation of osteological and archaeological information from other studies of CA-ALA-343, and comparison to two other skeletal populations from other SF Bay Area archaeological sites.

Osteological Methods

Age Estimation.

Determining the exact age at death of an individual is difficult. Skeletal populations are generally categorized into age ranges. Individuals seventeen years or younger will be labeled sub adults, and individuals eighteen and older will be termed adults. Age ranges for this study were established by Marshall (Marshall 2002 after Boylston and Roberts

1996) and are used within this study to maintain continuity. According to Schwartz (1995), epiphyseal fusion and the unification of the os coxae are the most accurate way to determine the age of a sub adult; however, dental formation and eruption are also reliable.

Age in sub adults were based upon dental development (Moores et al 1963), dental eruption (Ubelaker 1989), and epiphyseal fusion (Schwartz 1995, Buikstra and Ubelaker 1994). In adults, the auricular surface was examined to determine age at death (Lovejoy et al 1985). This method also has the advantage of using a portion of the pelvic girdle that survives well archaeologically. Todd's method, for the pubic symphysis, as refined by others, was also employed to establish age at death (Todd 1921, Katz and Suchey 1986, Suchey et al 1988, Griffin and Skelton 2000).

Although assessments of age are subjective, some of the changes that the cranium undergoes throughout life are more predictable. The age at death for the cranium of a sub adult was determined by the fontanelle closure described by Schwartz (Schwartz 1995). Cranial age at death for adults was determined by using the dental eruption method proposed by Ubelaker (Ubelaker 1989) as well as the basilar synchrondrosis fusion and cranial suture closure methods in Standard for Data Collection from Human Skeletal Remains (Buikstra and Ubelaker 1994).

Individuals seventeen years or younger were labeled sub adults, and individuals eighteen and older were termed adults. Age ranges for this study were established by Marshall (Marshall 2001 after Boylston and Roberts 1996) and are used within this study to maintain continuity (see

Table 4).

Table 4. Age Ranges (After Boylston and Roberts 1996).

Age	Range
Fetal	*In Utero*
Infant	Birth To Three Years
Child	Four To Twelve Years
Adolescent	Thirteen To Seventeen Years
Young Adult	Eighteen To Twenty Five Years
Young Middle Adult	Twenty Six To Thirty Five Years
Middle Adult	Thirty Six To Forty Five
Mature Adult	Forty Six And Older
Adult	Over Twenty Five
	(All Epiphyses Fused)

Sex Estimation.

Given the fragmentary nature of the collection, and the lack of sexually dimorphic features in immature individuals, sex was not estimated for sub adults in this study. The sexing of adults was accomplished using the Phenice method (Phenice 1969), which focuses on sexually asymmetrical differences in the sub-pubic region. This method is generally held to be the easiest most reliable method for sex determination from the post cranial skeleton.

Certain traits are considered generally male. Males have a more robust, rough skull as well as squarer orbits and retreating foreheads. Other traits are considered “female”. Females, generally, have smoother, more gracile skull structures and rounder eye orbits with a more vertical forehead. The differences are caused by differences in testosterone levels during puberty, as well as genetic factors and environment (Griffin and Skelton 2000, White and Folkens 1991).

Methods described by Wolfe and others (Griffin and Skelton 2000), as well as the methods described by Buikstra and Ubelaker (Buikstra and Ubelaker 1994) were used in the sexing of adult crania. These methods depend on the observations of sexual asymmetry that manifest during puberty and assign them a weighted score.

Trauma Analysis and Recording.

For the purposes of this study, trauma is defined as skeletal evidence of "any bodily injury or wound" (Roberts and Manchester 1995:65). Traumas are put into four general categories: dislocations, fractures, trauma from edged instruments, and shape and contour abnormalities (Ortner and Putschar 1985:55). The four categories of trauma are divided into deliberate and non-deliberate categories, and further subdivided into cases of perimortem or antemortem trauma (Marshall 2002, Roberts and Manchester 1999, Merbs 1989). Fragments were reassembled into complete skeletal elements as thoroughly as conditions allow and then examined for evidence of traumatic lesions. The analysis of the SFSU sample was conducted at the SFSU Bioanthropology laboratory.

Buikstra and Ubelaker stress the use of "standard terminology, standardly applied" (Buikstra and Ubelaker 1994:108). If the data collected is going to be of use to other researchers, descriptions need to be in unambiguous terminology and use precise identifications and details about the distribution of traumatic lesions. The authors caution against misinterpreting normal variation in human bone for pathological lesions.

Taphonomic and other post depositional changes are also frequently mistaken for pathological lesions. The authors state that researchers must have an appreciation of normal bone morphology in order to differentiate between the two. The coding system

developed in their text was used to record traumatic lesions. Precise descriptions of the attributes, number and location of traumatic lesions were taken, coupled with drawings of each lesion. Photographs and radiological examinations were not allowed as a condition for the analysis of this collection. Codes for type and shape of fractures, entry and exit wounds for projectile injuries, perimortem and antemortem determinations, callus formation, and dislocations were taken. Buikstra and Ubelakers' sentiments are echoed by Boylston (2004) in her instruction on the recording of weapons trauma.

Perimortem, Antemortem and Postmortem

The determination of perimortem or antemortem traumatic injury is based on the presence or absence of healing. In the absence of any healing, the researcher is forced to give a determination of perimortem. However, a fracture that occurs several hours or days after death will have the same appearance as a fracture sustained at the time of death. Post mortem fractures tend to form a right angle to the bones surface were most likely post depositional. The margins of these fractures have a "broken chalk appearance" (Walker 2001:576). This appearance is due to the lack of moisture and collagen that can be leached out in archeological contexts (White and Folkens 1991).

Sharp Force Trauma

The presence of sharp force trauma is established by the presence of a" linear defect in the bones surface with a well defined clean edge, flaking and roughening on the acute side with the possibility of terminal fracturing" (Boylston 2004:40). These may take the form of either cutmarks or chopmarks. Cutmarks on bone tend to be narrow, less than 1 millimeter (mm), and are caused by a slicing motion on the bones surface with an edged tool. Chopmarks are greater than 2mm in diameter and suggest the use of a heavy tool perpendicular of the long axis of the bone (Andrushko et al 2005). Cutmarks may be indicative of mortuary treatments such as flexing or defleshing an individual prior to burial, trophy taking, or deliberate traumatic injury during a violent conflict (Smith 1997, Olsen and Shipman 1994).

Fractures

According to Ortner and Putchar, a fracture in its broadest sense is defined as "any traumatic event that results in partial or complete discontinuity of a bone" (Ortner and Putchar 1985:55). Fractures may take the form of tension, compression, torsion, flexion and shearing (Ortner and Putchar 1985). These may be caused by a pathological weakening of the bone, acute insult to the bone or repetitive stress (Roberts and Manchester 1999).

Other noteworthy aspects of fractures include twig peel and flaking (Boylston 2004). Jurmain recommends the use of gross observation as well as radiography to corroborate a diagnosis of traumatic injury (Jurmain and Bellifemine 1997, Jurmain 2001). Although similar gross observations are used in this study to identify fractures, radiographs are not allowed as a condition of examining this collection.

Blunt Force Trauma to the Cranium

The presence of blunt force trauma is established by the presence of round of elliptical shaped "pond" type depressions in the ectocranial surface. Intentional depressed cranial fractures tend to be focused on the left side of the cranium, the result of a face to face confrontation with a right handed assailant (Walker 1989). However a Boylston point out, in the middle of a confrontation blows may be delivered to the cranium from any angle (Boylston 2004). Healed or antemortem cranial fractures exhibit smooth texture of their surfaces and rims, while perimortem fractures fracture lines, internal hinge fractures and spalling. Depression fractures caused by edged weapons tend to be elongated in shape and "V" shaped in cross section (Lambert 1997:84).

Projectile Wounds

The presence of projectile wounds is established by the presence of embedded projectile fragments in the wound (Jurmain 1991, Jurman 2001, Lambert 1997) or puncture wounds with characteristic beveling at the entrance or exits and adherent bone flaking (Boylston 2004). Lambert described projectile point wounds as bring caused by "stone, bone, wood, cane or metal tipped projectiles" (Lambert 1997:90). She states that there are several types of projectile point wounds including embedded points, glancing scars where the projectile point does not become embedded but still impacts the bone. The author also infers projectile point wounds from points that are found within the burial matrix but did not impact bone to avoid under representing the rate of projectile point trauma with in a population.

As this study focuses on interpersonal violence specifically, differentiating between deliberate and non-deliberate trauma is important. Of no less importance is differentiating between trauma and other taphonomic processes that may mimic trauma when examining dry bone (Ubelaker 1989, White and Folkens 1991). Fragments were reassembled into skeletal elements as thoroughly as the collection allowed and then examined for trauma (Lambert et al 2000). Trauma in archaeological populations is highly variable and requires a firm grasp of not only what lesions look like, but also their physical, mechanical and social causes.

For the purposes of this study trauma were not inferred from missing elements, burial inclusions or burial position due to fragmentary nature of the collection. Likewise, "parry" fractures will not be classified as deliberate trauma. Although some researchers consider the fracturing of the distal radius evidence of interpersonal violence (Lambert 1994 and 1997, Jurmain 1988 and 2001), the same type of injury may be sustained by falling, and so are to ambiguous to be included in deliberate trauma (Walker and Steckel 2002). Lambert (1994, 1997, 2002) recommends using projectile points from burial matrix as an indicator for weapons trauma if they are in close proximity to the burial; however, the nature of the archaeological context at CA-ALA-343 precludes this. Perturbation from agricultural practices and other biological factors such as rodent burrowing made these associations implausible.

Spondylosis

In this study spondylosis is included as a traumatic injury rather than a congenital defect (Aufderheide and Rodriguez-Martin 1998:63). Although there is thought to be a genetic predisposition to the fracturing of the *pars interarticularis*, in the population from CA-ALA-343 it is frequently accompanied by compression fractures of the vertebra, suggesting a repetitive stress fracture etiology rather than a strictly genetic malformation.

Methods for Comparison

In order to determine if rate of traumatic injury is high at CA-ALA-343, I will analyze the SFSU NAGPRA collection from CA-ALA-343, determine its MNI, the age and sex of newly inventoried individuals, and record any evidence of traumatic injury for the entire popluation. I will then amalgamate the data with the data collected by Jurmain (1988) and Marshall (2002) to achieve an overall population and rates of traumatic injury for the site. I will then assign individuals within the amalgamated population to a culturally affiliated group (Meganos, Ohlone or indeterminate) in order to pattern traumatic injury within the site to compare to patterns on other sites.

Burial associated artifacts will be accessed by type and material in an effort to determine if grave associations can be used to help assign a cultural affiliation to individuals in the amalgamated population. Burial posture will also be used as criteria for assigning a cultural affiliation. The dominant burial pattern for the Ohlone group is flexure whether lateral, ventral or dorsal. Conversely, the dominant burial mode for the Meganos is extension, usually ventral but dorsal extensions do occur (Hylkema 2002). In order to assign a cultural affiliation based on burial posture, available mortuary data will be used to determine the degree of flexure for each burial. There is a great deal of variability in descriptions of burial posture from researcher to researcher (Wiberg 2002).

The degree of flexure and orientation will be determined based on the following criteria in Table 5 (after Lillard et al 1939).

Table 5. Description of flexure in burial posture.

Attribute	Criteria
Ventral	Prone, the anterior surface of the body facing down
Dorsal	Supine, the posterior of the body facing down
Tight Flexed	Less than 45 degrees flexure between the femur and axial skeleton, arms folded and tucked in tightly towards the body.
Flexed	Approximately 45 to 90 degrees flexure from the femur to axial skeleton, arms folded
Loose Flexed	Approximately 90 to 150 degrees flexure from the femur to axial skeleton
Semi Extended	Approximately 165 to 180 degrees flexure from the femur to axial skeleton, tibia and fibula tucked against femur more than 45 degrees
Extended	No flexure of femur, tibia or fibula

Once the population is divided into three categories of "cultural affiliation"; Ohlone, Meganos and indeterminate, I will carry out a comparison of these three groups to determine rates of non deliberate and deliberate trauma for each as well as age and sex ratios. I will also carry out a comparison of rates of traumatic injury with populations from two other archaeological sites.

The sites I have chosen to compare to CA-ALA-343 are CA-SCL-674 (Grady et al 2001, Pastron 1999) and CA-CCO-474/H (Strother 2003, Estes et al 2002). These two sites were selected for the up to date methodology used for data collection, because they are contemporary with CA-ALA-343, and are known to have burial populations with evidence of traumatic injury but are not characterized as Meganos sites.

Table 6. Chronology for the Prehistoric SF Bay Area with site use periods for selected sites (marked as X). Dating Scheme B1 after Bennyhoff and Hughes 1987:149 and temporal c ategories after Bennyhoff and Milliken 1993.

Calendar Year	Dating Scheme B1	Temporal Categories	CA-ALA-343	CA-SCL-674	CA-CCO-474
1800 AD	Historic period	Late Period Phase 2	X		
1700 AD	Late period Phase 2-B		X	X	
1500 AD	Late period Phase 2-A		X	X	
1300 AD	Late period Phase 1-C	Late Period Phase 1	X	X	
1100 AD	Late period Phase 1-B		X	X	
900 AD	Late period Phase 1-A	Middle to Late Transition	X		X
700 AD	Middle to Late Period Transition		X		X
500 AD	Middle Period Terminal Phase	Upper Middle Period	X		X
300 AD	Middle Period Late Phase		X	X	X
100 AD	Middle Period Intermediate Phase	Lower Middle Period	X	X	X
200 BC	Middle Period Early Phase		X	X	X
500 BC	Early to Middle Period Transition	Early Middle Period	X	X	X
3000 BC	Early Period				

RESULTS

The results of the SFSU data collection, the amalgamation of information from the other studies at CA-ALA-343, and select numbers from the comparison sites are presented in this chapter. Age, sex and MNI information of newly inventoried individuals and observations on traumatic injury were collected for the SFSU collection. This includes data derived from the human remains found within the faunal bone material. Select data collected was added to select data from other researchers on additional populations recovered from CA-ALA-343 (Jurmain 1988 and Marshall 2002). Selective osteological data from two other SF Bay Area comparison sites are summarized here from data in Strother (2003), Estes et al (2002), Grady et al (2001), and Pastron (1999).

SFSU Collection Results

A total of thirty-three (33) individuals were present within the SFSU collection from CA-ALA-343. The SFSU NAGPRA collection consists of disarticulated skeletal elements representing thirty on (31) individuals and remains representing an additional

two individuals were discovered in the collection faunal remains from the site, giving a total MNI of 33.

The demographic breakdown for these individuals can be seen in following table. The population is skewed towards adults (12 of 33) and young adults also (12 of 33) and females, including possible females (9 of 33) and sexually indeterminate (19 of 33).

Table 7. SFSU population by Age Range and Sex.

N=33	Infant	Child	Adolescent	Young Adult	Young Middle Adult	Middle Adult	Mature Adult	Adult	Total
I	1	3	3	3	0	2	0	7	19
Female	0	0	0	4	0	0	0	1	5
Possible Female	0	0	0	3	0	0	0	1	4
Possible Male	0	0	0	1	0	0	0	1	2
Male	0	0	0	1	0	0	0	2	3
Total	1	3	3	12	0	2	0	12	33

F= fetal (*In Utero),* I = Infant (Birth To Three Years), C= Child (Four To Twelve Years), AO= Adolescent (Thirteen To Seventeen Years), YA= Young Adult (Eighteen To Twenty Five Years), YMA = Young Middle Adult (Twenty Six To Thirty Five Years), MIA= Middle Adult (Thirty Six To Forty Five), MA= Mature Adult (Forty Six And Older), A= Adult (Over Twenty Five, All Epiphyses Fused)

F=Female, PF=Possible Female, I= Indeterminate, PM=Possible Male, M=Male

Out of a total of 33 individuals in the SFSU NAGPRA population, eight (8) have suffered a traumatic injury. Traumatic injuries for the SFSU population included non-intentional fractures as well as intentional sharp force trauma (cut marks), blunt force trauma (depressed cranial fractures), and projectile point wounds. Of these eight, three (3) were perimortem injuries that showed no signs of healing (Burials 8C, UNK 1H, and UNK 4), and five (5) were antemortem, long standing injuries that were well healed (Burials 2A, UNK 1E, UNK 1G, 8A, 8B). Out of the eight (8) instances of traumatic injury, six (6) were determined to be the result of deliberate trauma.

Table 8. Trauma in the SFSU population.

N=8	Fractures	Sharp Force Trauma	Blunt Force Trauma	Projectile Point Injury	Totals
Perimortem	0	3	0	0	3
Antemortem	2	0	2	1	5
Total	2	3	2	1	8

Non-Deliberate Trauma in the SFSU Collection.

Two individuals were diagnosed with non-deliberate traumatic injury.

- **Burial UNK 1E**

  Burial UNK 1E has fusion of the 1st right metatarsal and the proximal 1st phalanx. This pathology may be the result of a traumatic injury causing the luxation of the articular factet of the metatarsal and phalanx and resulting in ankylosing of the joint (Aufderheide and Rodriguez-Martin 1998:105-106). Conversely, this pathology could be caused by Rheumatoid Arthritis, Psoriac Arthritis or Reiters Syndrome. These pathological conditions are generally bilaterally symmetrical and commonly affect the metacapophalangel joints, although tarsal involvement is also common (Aufderheide and Rodriguez-Martin 1998:99-105, Ortner and Putchar 1981:403-414). Unfortunately, only the right tarsal bones were present for this individual.

  Differential diagnosis: In the absence of other skeletal elements from this individual this lesion appears to be the result of a traumatic injury to the 1st right metatarsal and the proximal 1st phalanx.

  Codes after Ubelaker and Buikstra (1994): 5.0 Fractures: Bone 4.3.7, Side 1, Section 9, Aspect 9, Obs 1- 5.1.2, Obs 2- 5.4.8.

- **Burial UNK 1G**

  Burial 1G exhibits sclerotic bone formation on the sternal end of the right 1st rib. This pathological lesion may be the result of a periosteal response to a traumatic injury or traumatic arthritis. Conversely, it could also be a change due to psoraic arthritis (Aufderheide and Rodriguez-Martin 1998:105).

  Differential diagnosis: In the absence of other skeletal elements from this individual this lesion appears to be the result of a traumatic injury to the sternal end of the right 1st rib.

  Codes after Ubelaker and Buikstra (1994): 5.0 Fractures: Bone 3.6.1, Side 1, Section 1, Aspect 3, Obs 1- 5.1.2, Obs 2- 5.4.9.

Intentional trauma in the SFSU Collection.

Six individuals have lesions attributable to intentional trauma (interpersonal violence).

- **Burial 2A**

  Burial 2A is a young adult female exhibits an antemortem "pond" type depression fracture on the right and left parietals at the coronal suture (Boylston 2004). The lesion measures 22.78 millimeters (mm) by 18.76 mm and a depth of approximately 3 mm (Figure 11). The lesion affects both parietal bones and is

well healed, probably representing a long standing injury (Walker 1989, Walker 2001, White and Folkens 1991, Roberts and Manchester 1999). No radiating fractures or secondary pathological involvement were observed. This lesion is most likely the result of deliberate blow to the cranium.

Differential Diagnosis: It is possible that the depression fracture is the result of a non-deliberate traumatic injury caused by falling or being struck by a falling object. However, as this skeletal element is from a collection of comingled remains, tangential evidence regarding other traumatic injuries, burial context or pathological conditions are not available for interpretation.

Codes after Ubelaker and Buikstra (1994): 5.0 Fractures: Bone 2.0.2, Side 3, Section, Aspect, Obs 1- 5.1.7, Obs 2- 5.2.1, Obs 3- 5.5.1

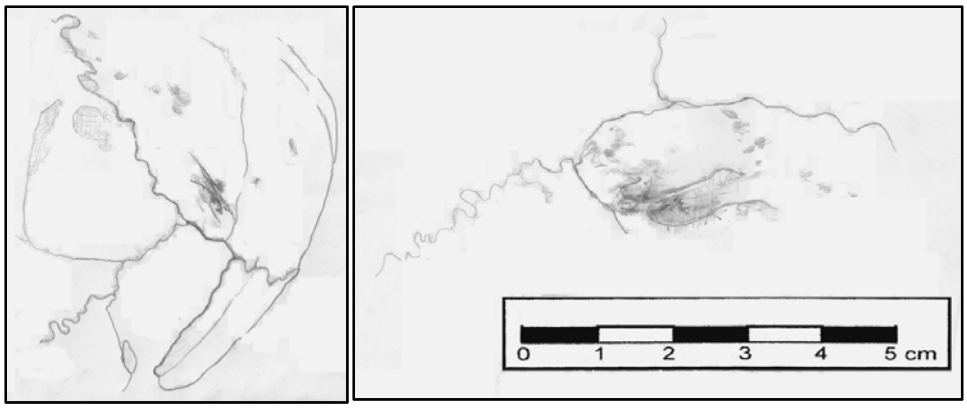

Figure 11. Burial 2A healed depression fractures (drawing McCarthy 2006).

- **Burial 8A**

  Burial 8A had two unambiguous well healed antemortem depression fractures on the right parietal (Figure 12). Lesion A is 12.9 m long by 2.1 mm maximum width and approximately 2 mm deep. Lesion B is 11.1 mm long by 2 mm maximum width by approximately 2 mm in depth. The margins of both lesions show a slight amount of flaking which is probably attributable to taphonomic processes rather than the blow which caused the wound. The inner table of the cranial bone shows remodeling of the trabecular bone and no stellate or radiating fractures were observed, indicating a long standing injury (Walker 1989, Walker 2001, White and Folkens 1991, Roberts and Manchester 1999).

Codes after Ubelaker and Buikstra (1994): 5.0 Fractures: Bone 2.0.2, Side 1, Section 1, Obs 1 - 5.1.2, Obs 2 – 5.2.3, Obs 3 – 5.4.3.

Figure 12. Burial 8A depression fractures on right parietal (drawing McCarthy 2006).

- **Burial 8B**

  Burial 8B exhibits an unambiguous antemortem projectile point wound right parietal (Figure 13). Although the classic “blow out” and internal beveling (Novak 2000) of a high velocity projectile point wound is still evident some healing has occurred. The lesion has a maximum diameter of 5.15 mm on the ectocranial surface and a maximum diameter of 8.8 mm on the endocranial surface. The trabecular bone between the inner and outer tables shows evidence of marked healing indicating a long standing wound (Walker 1989, Walker 2001,

White and Folkens 1991, Roberts and Manchester 1999). Although the wound penetrated the skull, here were no signs of any secondary infection. Although the cranium fractures along the edge of the lesion, this was probably the result of taphonomic processes rather than a result of the injury given the unstained and "broken chalk" appearance of the bone (Walker 2001). No fractures radiating from the site of the wound were observed.

Codes after Ubelaker and Buikstra (1994): 5.0 Fractures: Bone 2.0.2, Side 1, Section 3, Obs 1 – 5.1.8, Obs 2 – 5.2.4, Obs 3 – 5.2.5, Obs 4 – 5.4.3.

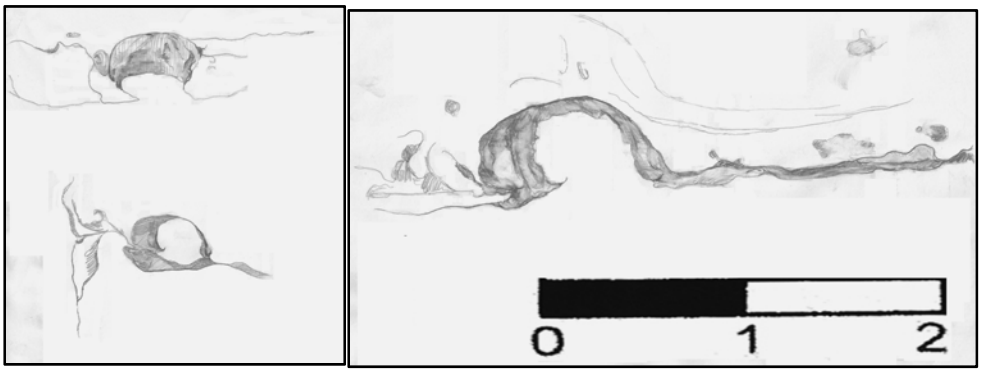

Figure 13. Burial 8B projectile point wound (drawing McCarthy 2006).

- **Burial 8C**

  Burial 8C carries seven unambiguous perimortem cut marks on the medial surface of the right proximal humerus just below the humeral head (Figure 14). The cut

marks are “V” shaped lesions associated with sharp force trauma by a stone tool (Lambert 1994, Olsen and Shipman 1994, Smith 1997) and show no signs of healing (Lovell 1997, White and Folkens 1991, Roberts and Manchester 1999). The cut marks are indicative of slicing rather than a forceful blow given their lack of skip lesions and polish (Boylston 2004), and appear to have been delivered perpendicular to the surface of the bone rather than an acute angle. The cut marks range in measurement from 2.5 mm to 7 mm. The cut marks are possibly an attempt to sever the tricep or coracobracialis muscle.

Codes after Ubelaker and Buikstra (1994): 5.0 Fractures: Bone 4.1.1, Side 1, Section 2, Obs 1 – 5.2.3, Obs 2 – 5.3.2.

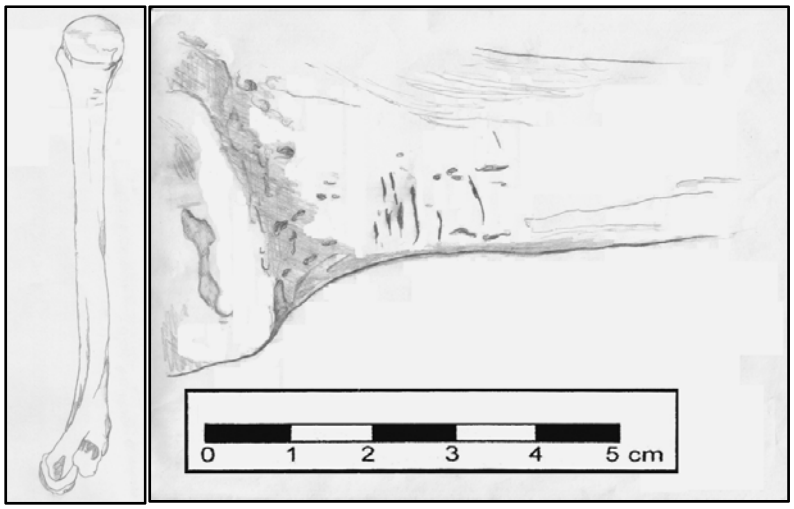

Figure 14 Burial 8C humerus with cutmarks (drawing McCarthy 2006)

- **Burial UNK 1H**

  Burial UNK 1H displays a total of nine unambiguous cut marks on the anterior medial right humerus (Figure 15), midshaft just below the deltoid tuberosity and proceeding medio-laterally. The cut marks are "V" shaped lesions associated with sharp force trauma by a stone tool (Lambert 1994, Olsen and Shipman 1994, Smith 1997) and show no signs healing (Lovell 1997, White and Folkens 1991, Roberts and Manchester 1999). The cut marks appear to have been delivered perpendicular to the surface of the bone rather than an acute angle, lacking polish or skip lesions associated with a forceful blow. The cut marks range in

measurement from 3.5 mm to 7.8 mm. Cut marks like this would be indicative of an attempt to sever the deltoid muscle.

Codes after Ubelaker and Buikstra (1994): 5.0 Fractures: Bone 4.1.1, Side 1, Section 3, Aspect 4, Obs 1 – 5.1.2, Obs 2 – 5.2.3, Obs 3- 5.3.2.

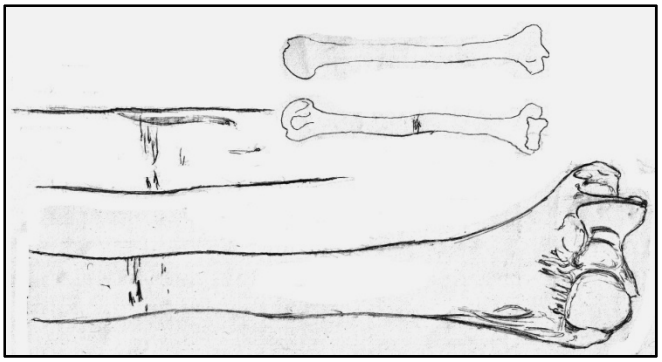

Figure 15 Unknown burial (UNK) 1H medial humerus cutmarks (drawing McCarthy 2006)

- **Burial UNK 4**

  Burial UNK 4 has two unambiguous cut marks on disto-medial surface right fibula (Figure 16). Cut marks are "V" shaped lesions associated with sharp force trauma by a stone tool (Lambert 1994, Olsen and Shipman 1994, Smith 1997) and show no signs healing (Lovell 1997, White and Folkens 1991, Roberts and Manchester 1999). The cut marks are indicative of slicing rather than a forceful

blow given their lack of skip lesions and polish (Boylston 2004). The cut marks appear to have been delivered perpendicular to the surface of the bone rather than an acute angle. The cut marks measure 3 mm and 4.5 mm.

Codes after Ubelaker and Buikstra (1994): 5.0 Fractures: Bone 4.3.4, Side 1, Section 1, Aspect 4, Obs 1 – 5.1.2, Obs 2 – 5.2.3, Obs 3- 5.3.1.

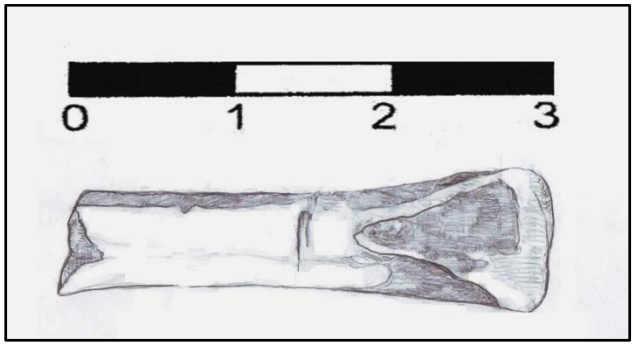

Figure 16. Unknown burial (UNK) 4 fibula of a three year old with cutmarks (drawing by McCarthy 2006).

Combined CA-ALA-343 Results

In this study, burial and mortuary data for three hundred ninety nine (399) individuals from CA-ALA-343 is synthesized. For CA-ALA-343, the overall site has a sample population of three hundred ninety nine (399) people, amalgamated from three excavations: SFSU 1968, SJSU 1985, and Archaeor 2000-01. There were a total of one hundred ninety one (191) Ohlone (flexed) pattern inhumations excavated at CA-ALA-343, while sixty four (64) individuals could be said to be of the Meganos (extended) pattern. One hundred forty four (144) individuals could not be assigned a cultural tradition. The data for these culturally unaffiliated people will be added to the overall CA-ALA-343 sample, but cannot be applied to the comparison of interpersonal violence rates at CA-ALA-343 of the Meganos versus the Ohlone individuals. The breakdown of each population is as follows. Please see Appendix B for additional detail (Marshall 2002, Hall et al 1988, Jurmain 1988, Archaeor 2005, Hylkema 2006)

Table 9. Cultural Affiliation by Age at CA-ALA-343.

	Total	Unaffiliated	Ohlone	Meganos
Indetermined	4	4	0	0
Infant	9	7	1	1
Child	38	19	15	4
Adolescent	31	11	15	5
Young Adult	52	23	19	10
Young Middle Adult	51	4	25	22
Middle Adult	31	5	21	5
Mature Adult	86	6	69	11
Adult	97	65	26	6
Total	399	144	191	64

F= fetal (*In Utero)*, I = Infant (Birth To Three Years), C= Child (Four To Twelve Years), AO= Adolescent (Thirteen To Seventeen Years), YA= Young Adult (Eighteen To Twenty Five Years), YMA = Young Middle Adult (Twenty Six To Thirty Five Years), MIA= Middle Adult (Thirty Six To Forty Five), MA= Mature Adult (Forty Six And Older), A= Adult (Over Twenty Five, All Epiphyses Fused)

Nearly one quarter (97) of the total population (399) has been assigned to the adult (25+) category. Just over one quarter (26%) is comprised of young adults (52) and young middle adults (51). Another approximate quarter (27%) is comprised of the other age groups including infants, children, adolescents and middle adults. Finally, nearly one quarter, 86 of the 399 (or 22%) individuals are mature adults.

Table 10. Cultural Affiliation by Sex at CA-ALA-343.

	Total	Unaffiliated	Ohlone	Meganos
Female	60	8	39	13
Possible Female	42	12	27	3
Indetermined	199	109	70	20
Possible Male	46	8	32	6
Male	52	7	23	22
TOTAL	399	144	191	64

F=Female, PF=Possible Female, I= Indeterminate, PM=Possible Male, M=Male

Half of the population (199 of 399) was of indeterminate sex. The female population (females and possible females) is roughly equivalent to the male population (males and possible males) overall. In the Ohlone segment of the population, 35% are female and 29% are male. In the Meganos segment of the population, males (44%) outnumber females (25%).

A total of eighty one individuals (81) or 20% individuals out of an amalgamated population of three hundred ninety nine (399) displayed evidence of traumatic injury. There are a total of 50 individuals with non-deliberate traumatic injuries. Traumatic injury that can be interpreted as deliberate trauma occurs in thirty one individuals (31) or approximately 8% of the population. Of the 81 individuals with traumatic injury, six (6) individuals sustained both non-deliberate and deliberate trauma.

Table 11. Deliberate and Non-Deliberate Traumatic Injury Totals for CA-ALA-343.

Total Number Of Burials	399	
Traumatic Injury CA-ALA-343	81	20%
Deliberate Traumatic Injury CA-ALA-343	31	8%

Sixty one (61) of the eighty one (81) traumatic injuries, or 75% were fractures. This means that 15% of the total population of three hundred ninety-nine (399) had fractures

of some kind. There are twelve (12) individuals with cut marks and nine (9) individuals had projectile point wounds, which is 39% and 29% of the thirty one (31) deliberate traumatic injuries respectively.

Table 12. Trauma for CA-ALA-343.

	Traumatic Injury Total	Deliberate Traumatic Injury
Fractures	57	11
Projectile Point	7	7
Cutmarks	8	8
Cutmarks and Projectile	1	1
Fractures and Cutmarks	3	3
Fractures and Projectile	1	1
Traumatic Myositis Ossificans	4	0
Total	81	31

Sixty three individuals at CA-ALA-343 had some type of antemortem traumatic injury which is 78% of the total traumatic injuries (81) and 16% of the total population (399). Perimortem traumatic injury is 17% of the total trauma (81), that is 14 individuals or 5% of the total population (399). Four (4) individuals had both antemortem and perimortem trauma.

Table 13. Perimortem and Antemortem Trauma at CA-ALA-343.

Antemortem	63
Antemortem and Perimortem	4
Perimortem	14
Total	81

Traumatic injuries were divided according to cultural affiliation. The Meganos represent sixty four (64) of the total population (399) and have seventeen (17) observable instances of trauma. These seventeen (17) constitute 27% of the Meganos segment as a whole with nine (9) deliberate traumatic injuries, or 14%. The Ohlone segment, or nearly half (48%) of the total population (399), has forty nine (49) individuals or 26% with traumatic injuries. Of these, there are 15 examples of deliberate trauma, or 9% of the Ohlone segment. The rate for deliberate trauma for the Meganos segment of the CA-ALA-343 population is nearly twice that of their Ohlone counterparts. Two (2) Meganos individuals and four (4) Ohlone had both deliberate and non-deliberate trauma.

Table 14. Trauma at CA-ALA-343 by Cultural Affiliation.

CA-ALA-343 Total Population (399)			
Cultural Affiliation	Meganos	Ohlone	Unaffiliated
Total	64	191	144
Trauma	17	49	15
Deliberate Trauma	9	15	7

The rates for fractures are about the same, 20% for the Meganos segment and 19% for the Ohlone segment of the population. The rates for cut marks are 4% for the Meganos and 3% for the Ohlone. Projectile point wounds affected at least 5% of the Meganos versus less than 3% of the Ohlone.

Table 15. Types of Traumatic Injury by Cultural Affiliation for CA-ALA-343.

	Meganos	Ohlone	Unafffiliated	Total Traumatic Injury
Fractures	12	35	10	57
Projectile Point Wounds	3	3	1	7
Traumatic Myositis Ossificans	0	4	0	4
Cutmarks	1	4	3	8
Fractures And Cutmarks	1	1	1	3
Cutmarks And Projectile	0	1	0	1
Fractures And Projectile Point Wounds	0	1	0	1
TOTAL	17	49	15	81

For young middle adults, the rate of traumatic injury is 5% of the total population (19 of 399). This rate matches that of the Ohlone segment of the population (10 of 191), although for the Meganos segment the rate is 13% for young middle adults (8 of 64). Mature adults (30 of 81) account for 37% of the population with traumatic injury. Of these, twenty four (24) out of thirty (30) of the individuals fall into the Ohlone segment of the population (80%).

Table 16 Traumatic Injury By Age And Cultural Affiliation For CA-ALA-343.

	Total	Meganos	Ohlone	Unaffiliated
Indetermined	0	0	0	0
Infant	0	0	0	0
Child	3	0	1	2
Adolescent	5	1	4	0
Young Adult	8	0	4	4
Young Middle Adult	19	8	10	1
Middle Adult	7	1	5	1
Mature Adult	30	5	24	1
Adult	9	2	1	6
Total	81	17	49	15

F= fetal (*In Utero)*, I = Infant (Birth To Three Years), C= Child (Four To Twelve Years), AO= Adolescent (Thirteen To Seventeen Years), YA= Young Adult (Eighteen To Twenty Five Years), YMA = Young Middle Adult (Twenty Six To Thirty Five Years), MIA= Middle Adult (Thirty Six To Forty Five), MA= Mature Adult (Forty Six And Older), A= Adult (Over Twenty Five, All Epiphyses Fused)

Young middle adults account for 29% of individuals with deliberate trauma (9 of 31). Young middle adults account for 34% of the Meganos population (22 of 64, see Table 9),

but have 44% (4 of 9) of the deliberate traumatic injury for that population. Young middle adults (25 of 191) make up 13% of the Ohlone segment of the population and have a rate deliberate traumatic injury of 33% (5 of 15). Mature adults represent 69 of 191 or 36% the Ohlone segment of the population and also have 33% of the deliberate trauma.

Table 17. Deliberate Traumatic Injury By Age And Cultural Affiliation at CA-ALA-343.

	Meganos	Ohlone	Unaffiliated
Indetermined	0	0	0
Infant	0	0	0
Child	0	0	1
Adolescent	0	3 (*1)	0
Young Adult	0	2	3
Young Middle Adult	4	5 (*1)	0
Middle Adult	1	0	0
Mature Adult	3 (*2)	5 (*2)	0
Adults	1	0	3
Total 31	9	15	7

*Indicates individuals with both deliberate and non-deliberate

F= fetal (*In Utero)*, I = Infant (Birth To Three Years), C= Child (Four To Twelve Years), AO= Adolescent (Thirteen To Seventeen Years), YA= Young Adult (Eighteen To Twenty Five Years), YMA = Young Middle Adult (Twenty Six To Thirty Five Years), MIA= Middle Adult (Thirty Six To Forty Five), MA= Mature Adult (Forty Six And Older), A= Adult (Over Twenty Five, All Epiphyses Fused)

In general, mature adults sustained twenty five (25) of the total (57) number of fractures which is 44%. Young middle adults had 12 of the 57 fractures, which is 21%.

Out of a total of nine (9) projectile wounds, young middle adults had four (4) or 44%. Young adults had (2) and adults had two (2) projectile point wounds, with the remaining projectile point wounds affecting an adolescent. There were a total of twelve (12) individuals with cut marks. Half of these were distributed between young middle adults (3) and (3) for adolesecents.

Table 18. Types of Trauma by Age for CA-ALA-343.

	C	AO	YA	YMA	MIA	MA	A	TOTAL
Fractures Total	2	2	3	12	7	25	6	57
Projectile Point Wounds	0	0	2	3	0	0	2	7
(Deliberate Fractures)	0	0	(1)	(2)	(1)	(3)	(1)	(8)
(Non Deliberate Fractures)	(2)	(2)	(2)	(10)	(6)	(19)	(5)	(46)
Traumatic Myositis Ossificans	0	0	1	0	0	3	0	4
Cutmarks	1	1	2	3	0	1	0	8
Fractures And Cutmarks	0	1	0	0	0	1	0	2
Cutmarks And Projectile	0	1	0	0	0	0	0	1
(Both Deliberate And Non-Deliberate Fractures)	0	0	0	0	0	(3)	0	(3)
Fractures And Projectile Point Wounds	0	0	0	1	0	0	0	1
Deliberate Fractures and Cutmarks	0	0	0	0	0	0	1	1
TOTAL	3	5	8	19	7	30	9	81

F= fetal (*In Utero)*, I = Infant (Birth To Three Years), C= Child (Four To Twelve Years), AO= Adolescent (Thirteen To Seventeen Years), YA= Young Adult (Eighteen To Twenty Five Years), YMA = Young Middle Adult (Twenty Six To Thirty Five Years), MIA= Middle Adult (Thirty Six To Forty Five), MA= Mature Adult (Forty Six And Older), A= Adult (Over Twenty Five, All Epiphyses Fused)

Out of a total number of 81 individuals with traumatic injury, the 29 females (females and possible females) are 36%. Males (males and possible males) represent 41%, or 33 of the 81 individuals with trauma. There were 19 individuals whose sex could not be estimated but they represent 23% of the total (81) for traumatic injury. Females of the Ohlone segment had 18 or 22% of the overall traumatic injury (81) whereas females (including possible females) of the Meganos segment only had 10 or 12%. There were an equal number of males (including possible males) in the Ohlone (12) and Meganos (12) segments. This is actually only 6% (12 of 191) and 19% (12 of 64), respectively for the segments of the population.

Table 19. Trauma by Sex and Cultural Affiliation for CA-ALA-343.

N=81	Total	Meganos	Ohlone	Unaffiliated
Females Trauma	20	1	18	1
Possible Females Trauma	9	9	0	0
Indeterminate Sex Trauma	19	4	7	8
Possible Males Trauma	11	2	3	6
Males Trauma	22	10	9	3

F=Female, PF=Possible Female, I= Indeterminate, PM=Possible Male, M=Male

Only seven (7) females overall or 23% were affected by deliberate trauma versus seventeen (17) males or 55% of the total (31) individuals. None of the females with deliberate trauma were from the Meganos segment of the population. Six (6) of the females or 3% of the Ohlone population were affected by deliberate trauma. Seven

Meganos males (including possible males) have deliberate trauma or 11% of their population (64). In contrast, six (6) Ohlone males or 3% of the Ohlone segment (191) had deliberate trauma.

Table 20. Deliberate Traumatic Injury by Sex and Cultural Affiliation.

	N=31	Meganos	Ohlone	Unaffiliated
Females	7	0	6 (*3)	1
Possible Females	0	0	0	0
Indeterminate	7	2	3 (*1)	2
Possible Males	7	2	3	2
Males	10	5	3 (*2)	2

F=Female, PF=Possible Female, I= Indeterminate, PM=Possible Male, M=Male

The sixty (60) total fractures are fairly evenly distributed among males (including possible males) and females (including possible females), twenty two (22) males and twenty four (24) females. Males (including possible males) have six (6) of the nine (9) projectile point wounds or 67%. Males (including possible males) also have half or five (5) of the ten (10) total cutmarks.

Table 21. Traumatic injury by sex for CA-ALA-343.

	F	PF	I	PM	M	TOTAL
Fractures	15	7	14	7	14	57
Projectile Point Wounds (Deliberate Fractures)	1	0	0	3	3	7
(Non Deliberate Fractures)	(3)	0	(2)	(3)	(2)	(10)
Traumatic Myositis Ossificans	(10)	(7)	(12)	(4)	(11)	(46)
Cutmarks	1	2	0	0	1	4
Non-deliberate Fractures And Cutmarks	2	0	2	1	3	8
Cutmarks And Projectile (Both Deliberate And Non-Deliberate Fractures)	0	0	1	0	1	2
Fractures And Projectile Point Wounds	(2)	0	0	0	(1)	(1)
Deliberate Fractures and Cutmarks	1	0	0	0	0	1
TOTAL	0	0	1	0	0	1
	20	9	19	11	22	81

F=Female, PF=Possible Female, I= Indeterminate, PM=Possible Male, M=Male

One hundred thirty six (136) of the total 399 individuals on site were found with burial associated artifacts. Forty two (42) or 66% of the 64 Meganos, sixty eight (68) or 36% of the 191 Ohlone, and twenty six (26) or 18% of the unaffiliated individuals had artifacts.

Table 22 Artifacts and Affiliation for CA-ALA-343

Total Burials with Artifacts	136	Total Burials CA-ALA-343	399		136 of 399	34%
Meganos with Artifacts	42	Meganos Total	64	66% of Meganos 42 of 64	42 of 399	11%
Ohlone with Artifacts	68	Ohlone Total	191	36% of Ohlone 68 of 191	68 of 399	17%
Unaffiliated with Artifacts	26	Unaffiliated Total	144	18% of Unaffiliated 26 of 144	26 of 399	7%

CA-SCL-674 Rubino

At CA-SCL-674, out of a population of two hundred and twenty four (224) individuals, there are sixty four (64) instances of traumatic injury or 29%, with (23) or 10% being intentional injuries. Of these, seven (7) were antemortem, while sixteen (16) were perimortem. Antemortem deliberate traumas were limited to depressed cranial fractures in those seven (7) individuals, while perimortem deliberate trauma took the form of cutmarks, projectile point wounds, puncture wounds, or some combination of these. One (1) individual had both antemortem and perimortem deliberate traumatic

injuries while five (5) individuals had more than one kind of perimortem deliberate trauma. Ten (10) individuals showed evidence of perimortem cut marks, while perimortem projectile point and puncture wounds occurred in six (6) individuals. Of these, three (3) individuals had both. Young middle adult males were affected by 24% (5 of 23) by intentional trauma, including one antemortem depression fracture, three perimortem projectile point wounds, and three instances of cut marks. Mature adult females and young adult males each had three (3) instances of deliberate trauma, which is 13% respectively. Middle adults, male and female, and Mature adult males all had two instances of deliberate traumatic injury a piece. Please see Appendix C for additional detail (Grady et al 2001, Pastron 1999).

CA-CCO-474/H Hercules

At CA-CCO-474/H, out of a population of one hundred thirteen (113) individuals, fourteen (14) sustained some type of traumatic injury, or 12%. Of the fourteen (14) individuals with traumatic injury, 50% or seven (7) were deliberate. Those with deliberate traumatic injuries make up 6% of the total population. Four (4) or 57% of the deliberate traumatic injuries affected mature adults, which was split 50 – 50 between two (2) males and two (2) females. There was one (1) middle adult male, (1) young middle adult female, and (1) young adult female with evidence of deliberate trauma. Three (3)

males had antemortem deliberate traumatic injuries as opposed to one (1) female. Three (3) females sustained perimortem deliberate traumatic injuries. Those with depression fractures consist of 57% of the deliberate traumatic injuries and 4% of the total population, four (4) individuals were affected. One (1) individual, a mature adult male, suffered both depression fractures and cutmarks, though they were all antemortem. Perimortem cutmarks occurred on three (3) individuals, all females. One of the individuals had cutmarks indicative of scalping and dismemberment. A second individual had cutmarks and a projectile point wound. The third individual had sharp force trauma to the inner eye orbit. Please see Appendix B for additional detail (Strother 2003, Estes et al 2002).

DISCUSSION

The discussion that follows concerns the results of the SFSU collection, the amalgamated information from other CA-ALA-343 osteological studies, and the archaeological sites used for comparison, CA-SCL-674 and CA-CCO-474/H.

The SFSU Collection

The SFSU collection represents an MNI of thirty three (33) individuals. It is difficult to determine a specific age group when the individual is only represented by a few skeletal elements, unless they are diagnostic. Similarly, accurately estimating the sex of individuals within a collection of disarticulated skeletal elements is difficult to achieve unless the elements in question is sexually diagnostic. For example, nineteen (19) of the thirty three (33) individuals were sexually indeterminate. There were also twelve (12) individuals who could only be assigned to the adult (over age 25) category. This is attributable to the incomplete and disarticulated nature of the collection. No cultural affiliation could be assigned to the SFSU population as these individuals also lacked burial proveniences and mortuary data. This tends to skew the amalgamated overall population towards unaffiliated individuals.

The combined CA-ALA-343 population

Although the overall rate of deliberate trauma at CA-ALA-343 is not particularly high, the rate of deliberate trauma for Meganos people at CA-ALA-343 (14%) is significantly higher than their Ohlone counterparts (8%). This could be due to population stress brought on by two differet cultural groups occupying the same area at the same time. Alternatively, a large segment of the Ohlone population has been lumped into the culturally indeterminately category. Differential burial treatment may also be the culprit, not all of CA-ALA-343 has been excavated, and more Ohlone people may still be interred there.

The overall rate of traumatic injury is (20%) for the whole population with the rates of traumatic injury in the Meganos segment roughly equal to that of the Ohlone segment. However, the Ohlone segment has a higher rate of non deliberate trauma. Traumatic injury among mature adult females in the Ohlone segment of the population was 22%. A possible explanation for the higher rate of non deliberate trauma in the Ohlone population is that demographically there is larger population of mature adults who maybe more prone to accidental injury.

The population is skewed towards mature adult and the general adult categories. Adults (97) are 24% of total population. This may be because the ends of the long bones

remain intact more readily than the more diagnostic skull or pelvis when the site is being excavated with the aid of heavy equipment. Moreover, differential burial treatment may also be to blame as not all of CA-ALA-343 has been excavated, and more Ohlone people may still be interred there.

Although the male and female segments of the population are balanced or equal (102 to 98), subadults are underrepresented. They may be buried elsewhere, or archaeological preservation of immature bone on the site is poor. This is likely considering that it has been used as farmland for the last 140 years, and is subject to the taphonomic effects of plowing.

Half of the population (199 of 399) was of indeterminate sex; this includes 70% of the Ohlone segment and 31% of the Meganos segment of the population. This is largely due to preservation and taphonomic issues as well as excavation damage resulting in a lack of sexually diagnostic skeletal elements.

There is an unusually high amount of males (including possible males) in the Meganos segment of the population. Differential burial treatment may be responsible as not all of CA-ALA-343 has been excavated. It is also possible that females may be lumped into the sexually indeterminate group due to preservation issues and the lack of elements for reliable sexing. It is also possible that the rate of deliberate trauma is higher for

Meganos. Although no specific ethnographic data on Meganos is available, in prehistoric California populations males typically engage in warfare rather than females.

Young middle adults represent 5% general traumatic injury but 29% of those with deliberate trauma. The numbers suggest that young middle adult is the age group most likely to be involved in violent encounters like warfare.

There is a relatively high rate of antemortem trauma at CA-ALA-343, sixty three (63) of eighty one (81) traumatic injuries showed some level of healing. This may be due to a relatively low severity for traumas on the site, good general health or some level of medical care.

Stature was once thought to be a marker of the Meganos Pattern, as Meganos individuals appeared larger to excavators and other researchers. However, a study of flexed and extended individuals carried out by Marshall (2002) suggests that there is no statistically meaningful difference between the two populations. This suggests that Meganos people look larger in a burial setting because they are in an extended position.

Although artifacts were thought to be of some utility in identifying the Meganos Aspect, analysis showed no patterns for material culture. The use of diagnostic artifacts to determine cultural affiliation was also problematic. Artifact types thought to be diagnostic of the Meganos such as mica pendants, *Haliotis* pendants and bone wands or

spatulas were found with both Ohlone and Meganos affiliated individuals and both sexes within each group. It is interesting to note that more Meganos affiliated individuals had artifact associations and that these association were more numerous and of a greater variety than their Ohlone counterparts. The flexed burials with large artifacts lots with shell beads and pendants may be indicative of the Augustine Pattern among the Ohlone, of the Middle to Late Transition or Late Period.

Warfare at CA-ALA-343

As Lambert (2002) suggests, archaeological studies of warfare focus on four lines of inquiry, settlement patterns, defensive structures, iconography and weaponry. These lines of inquiry are applied to CA-ALA-343 as follows.

Settlement Patterns.

CA-ALA-343 does not lend itself to settlement pattern analysis. Although there is some midden material at CA-ALA-343 it is in no way indicative of being a village large enough to support a group of people over the time span the site was occupied.

Defensive Structures.

It has been suggested that the shell mounds surrounding the San Francisco Bay could have acted as a defensive structure of sorts (Leventhal 1993). However, any protection

they may have offered was the result of natural barriers such as the existing slope and surrounding estuaries rather than any particular built defense.

Iconography.

As stated earlier, in the literature review, very few examples (if any) of Ohlone iconography exisit and CA-ALA-343 does not provide any iconography.

Weaponry.

Projectile point types found on site at CA-ALA-343 are predominately lanceolate types and could have been used for either hunting or warfare. Keeley (1996) suggests that these types of projectile points were fashioned with out shoulders or side notches so they would stay in the wound they created. Several of these were found in burial contexts at CA-ALA-343. Perhaps as Pastron (1999) suggests at CA-SCL-674, these types of projectile points were made of exotic materials (obsidian) and costly in time to make. He states that these points could have been created in anticipation of combat (Pastron 1999). However, since you have to be able to eat before you can engage in warfare, it would be equally valid that they were created for hunting as fighting.

Lambert (1994) and others (Walker 2001, Wiberg 2002, Andrushko et al 2005, Andrushko et al 2010) advocate for the use of projectile points in association with burials as evidence of interpersonal violence. According to SFSU NAGPRA files, Burial 3A from the SFSU collection had an obsidian point lodged in its skull. Described to be "Burial 3 skull with obsidian point embedded in zygomatic bone behind left zygomatic arch, male skull, adult" (handwritten notes in NAGPRA department file, no name, no date, concerning site CA-ALA-343). No photos or slides could be located and no drawings were made. However, at least two photographs were reportedly taken J.P. Galloway of the SFSU Anthropology Department in 1971. The slide record which lists pictures taken of primarily CA-SMA-125 human skeletal elements ends with two entries of "cranium ALA-343 with projectile". According to the NAGPRA notes, the point was removed to curate separately as a burial associated artifact. Unfortunately, the bone in the area where the projectile point was reported to have been lodged was too damaged to determine if the point was actually penetrating the skull. This individual was not included either in the numbers for interpersonal violence.

At CA-ALA-343, three (3) burials from the Archaeor sample (89, 129 and 230) have projectile points buried with them but no discernable traumatic injury. Although it is

possible that these individuals suffered trauma to soft tissue, this is too ambiguous to use as evidence of interpersonal violence (Marshall 2002, Jurmain 2001).

Taphonomy.

The crushing of skeletal elements by the grounds' weight as the plasticity of the bone has suffered from denaturing was also common at CA-ALA-343, as was fracturing from agricultural practices and excavation damage. Prior to its development as retail space and housing, CA-ALA-343 was used as agricultural tillage for since at least 1860. The effects of plowing, and the application of fertilizers and pesticides on buried skeletal elements must be taken under consideration when interpreting the site. Shallow burials are subject to post mortem damage from plowing and crushing by the weight of farm equipment (Haglund and Sorg 2002). This may be a function of archaeological preservation as much as any particular trend in the population. Since CA-ALA-343 was used for agricultural purposes for most of the twentieth century and the burials recovered showed significant signs of postmortem fracturing as a result of this activity, some antemortem or perimortem fracturing may be obscured. The evidence of traumatic injuries at CA-ALA-343, consisting of unambiguous projectile point wounds, depression fractures and cut mark lesions may be obscured by post depositional fracturing.

Cannibalism.

Although confirming or denying the existence of cannibalism is not the focus of this study, Wildesen suggests it as one of several explanations for the fragmentary remains found at CA-ALA-343 (Wildesen 1968:np). If cannibalism was being practiced at CA-ALA-343, it would require an in depth study on butchering practices in the vicinity, specifically observations of the way in which carcasses are reduced and prepared, as well as cooking practices. The results of these inquiries could then be compared to human skeletal evidence.

The comparison of CA-ALA-343 to CA-SCL-674 and CA-CCO-474/H.

At CA-ALA-343 to overall rate of traumatic injury was 20% and deliberate trauma was 8%. The rate of traumatic injury was 29% and the rate of deliberate trauma was 10% at the Rubino site, CA-SCL-674 after parrying fractures were removed from the Rubino sample (Grady et al 2001, Pastron 1999). The rate of deliberate trauma at CA-CCO-474/H was 6% and 12% for general traumatic injury (Strother 2003, Estes et al 2002).

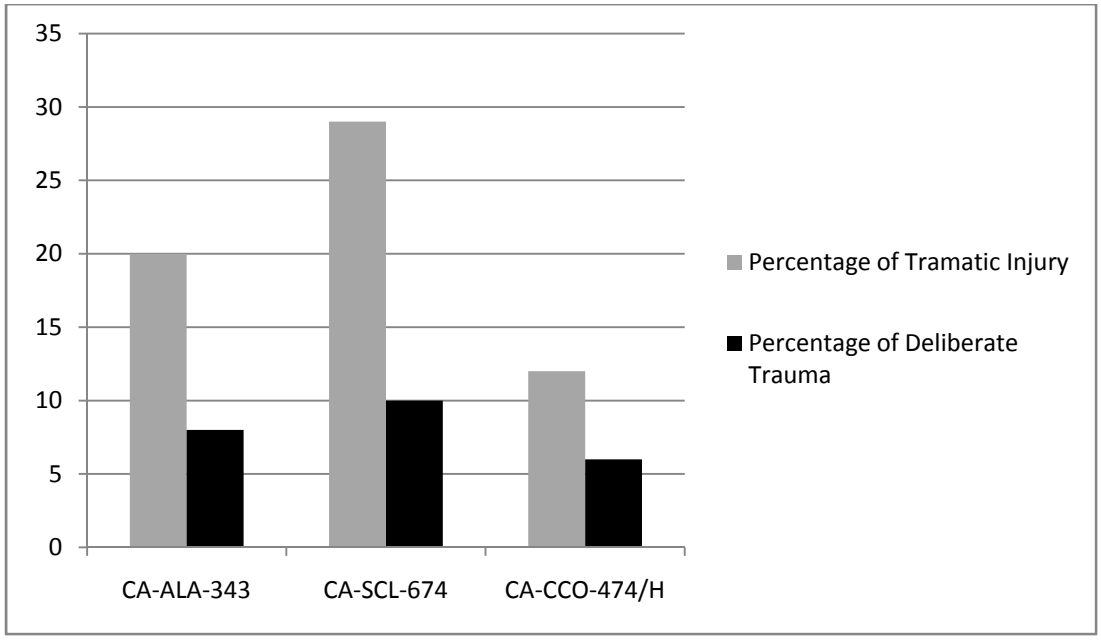

Figure 17. Percentages of Traumatic Injury and Deliberate Trauma by Archaeological Site (Marshall 2002, Jurmain 1988, Grady et al 2001, Pastron1999, Strother 2003, Estes et al 2002).

The patterns of deliberate trauma in terms of perimortem cutmarks at CA-ALA-343 are more consistent with disarticulation at burial than of trophy taking. The fine cut marks are on or near major muscle attachments, but not the articular joints such as the ones seen at CA-SCL-674. Patterns of deliberate trauma at CA-SCL-674 are indicative of trophy taking (Grady et al 2001, Andrushko et al 2005, Andrushko et al 2010). They involve cut marks on the distal humerus and distal femur. CA-SCL-674 takes the form of

dismemberment and removal of long bones (Grady et al 2001, Andrushko et al 2005, Andrushko et al 2010). CA-CCO-474/H has one individual with evidence of this as well. CA-CCO-474/H trophy taking also exists in the form of scalping (Strother 2003, Estes et al 2002). At CA-ALA-343, one individual has scalping (Marshall 2002). There are cut marks on the postcranial skeleton at CA-ALA-343 but the locations of the cut marks are different. Also at CA-ALA-343, a pendant fashioned from the superior surface of the tibia was recovered (Marshall 2002). Human bone artifacts are found at CA-SCL-674, specifically human radii and ulnae that have been polished and drilled (Grady et al 2001, Pastron 1999). This is interpreted as additional evidence of trophy taking.

Patterns of Deliberate Traumatic Injury.

The overall types of deliberate traumatic injury; depressed cranial fractures, embedded projectile point wounds, and cut marks, can be seen at all three sites in varying degrees. CA-SCL-674 shows evidence of interpersonal violence in the form of depressed cranial fractures embedded projectile point wounds, and penetrating wounds. In addition several individuals show unambiguous evidence of trophy taking (Andrushko et al 2005, Andrushko et al 2010). The pattern of deliberate trauma for trophy taking consists of "V" shaped cut marks around the articular surfaces of the humerus and femur associated with missing skeletal elements (radius, ulna, tibia and fibula). Individuals from CA-CCO-

474/H also show evidence of forearm trophy taking. Burial 22.2 from the CA-474/H population does have cutmarks indicative of trophy taking on the distal right humerus and the right radius and ulna are missing (Strother 2003).

The patterns of injury at CA-ALA-343 and CA-CCO-474/H are similar to one another in that they involve trophy taking of a different kind, scalping. Although the rate of deliberate traumatic injury varies between the two, the types of deliberate traumatic injury are similar. Burial 00-202 in the 2001 Archaeor CA-ALA-343 sample (Marshall 2002) and Burial 22.2 from the CA-CCO-474/H (Strother 2003) bore traumatic lesions the strongly support a diagnosis of scalping. This type of trophy taking obviously differs in presentation from CA-SCL-674.

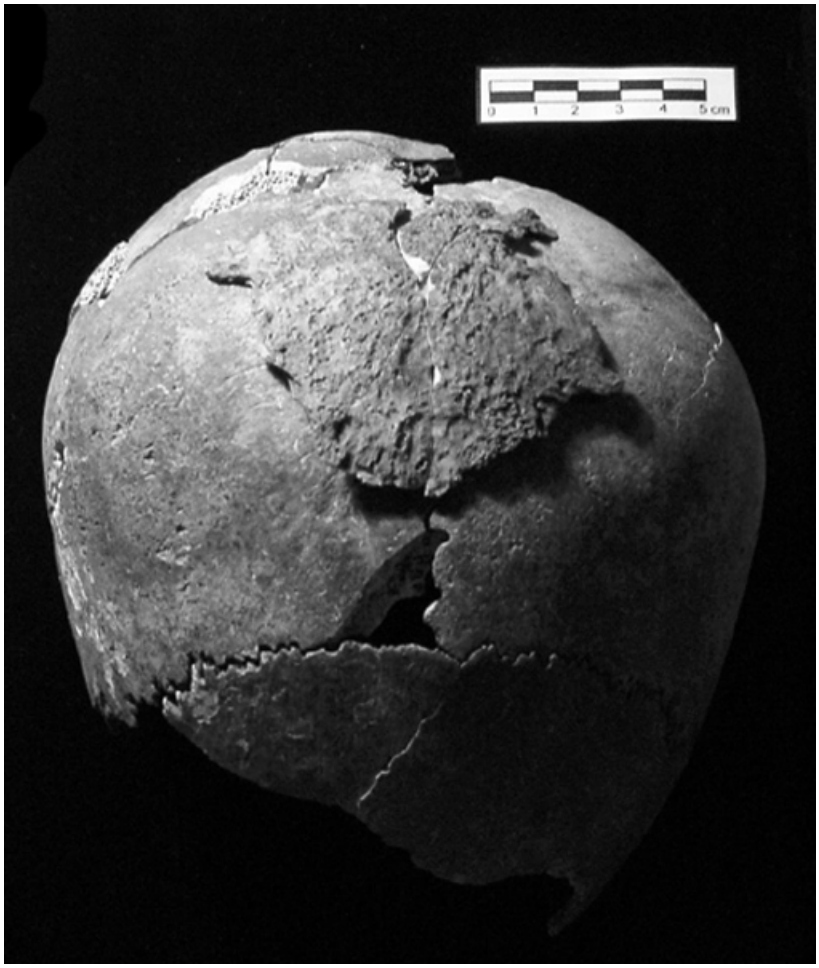

Figure 18. Probable healed scalping of Burial 00-202 with sclerotic deposit *in situ*. Photo Courtesy of Christine Marshall 2002.

Although there were a total of 28 multiple (two or more) internments at CA-ALA-343, five of which had one or more individuals (seven people total) with evidence of deliberate trauma (interpersonal violence), there were no "mass" burials at CA-ALA-343

like those seen at the site of Crow Creek (Wiley 1990). Burials 10 and 11 (from the 2001 Archaeor excavation) were buried together, and both had antemortem depression fractures. Burial 163 and 164 were simutaniously interred with one individual suffering from an antemortem depression fracture. Burial 151 and 152 were also intered in a double burial with one of the individuals showing evidence of a perimortem projectile point wound. The same is true of Burial 199 and 185 as well as of a triple burial (Burials 87, 89 and 90).

CA-SCL-674 has thirteen double burials (representing 26 people). Of these, Burial 134 two individuals have projectile point wounds (Burial 134 and 241) and another (Burial 206) has a healed lesion of the left scapula.

CA-CCO-474/H has a triple burial (Burials 22.1, 22.2 and 22.3) and six double burials (Burials 12.1 and 12.1, 41.1 and 41.2, 45.1 and 45.2, 68.1 and 68.2, 74.1 and 74.2, 98.1 and 98.2). The triple burial has one individual with cut marks, a second individual with cutmarks associated with scalping, and a third individual with cutmarks inside the eye orbit.

All of these SF Bay Area sites suggest a constant low intensity type of intergroup conflict rather than large scale warfare or a massacre episode: CA-SCL-674 (Grady et al 2001), CA-CCO-474/H (Strother 2003), CA-ALA-328 (Ryan 1972), CA-ALA-329

(Jurmain 1988), CA-SCL-478 (Wiberg 2002), CA-ALA-314 (Wiberg 1984), CA-ALA-613 (Pilloud 2003). The Norris Farm site (Milner and others 1991) in Illinois is also similar to SF Bay Area sites, with a population coping with a constant, if low intensity state of warfare. The more constant nature of the pattern of deliberate traumatic injury at Norris farms may be due to the "frontier" nature of its existence. Similarly, the Fay Tolton site (Holliman and Owsley 1994) and the Heerwald site (Bovee and Owsley 1994) on the Great Plains also exhibit osteological evidence for warfare, but on a small and intermittant scale.

Keeley (1996) suggests that there are three different types of warfare in pre-state societies; prearranged pitch battles, small scale raiding and ambushes and large scale raids. Keeley proposes, and ethnographic sources corroborate, the idea the casualty rate at prearranged battle was relatively low, and they were halted when an individual was seriously wounded or killed (Levy 1978, Keeley 1996).

Lamberts' analysis of the archaeological evidence of warfare states these types of battles would be difficult to see archaeologically as would ambush encounters (Lambert 2002). Evidence of large scale raids (i.e. victims of interpersonal violence lying on top of house floors) has been documented in the SF Bay Area (Pesnichak and Evans 2005). However, it is rare, and none of this type of archaeological evidence was uncovered at

CA-ALA-343. Keeley suggest that encounter battles and ambushes account for the majority of fatalities in pre-state warfare (1996). Lambert agrees, suggesting that small scale encounters resulted in a high rate of fatalities over extended periods of time (Lambert 2002). Lambert (1994:141-1470) states that the lack of mass graves like the one at Crow Creek (Wiley 1990) suggests that warfare was a small scale but constant feature in prehistoric California.

In her discussion of the possible causes for warfare in the SF Bay Area, Lambert cites "linguistic and archaeological evidence for population intrusions from several adjacent culture regions" (Lambert 2002:219). It is very likely that the Meganos Intrusion is just such an occurrence.

The rates of deliberate traumatic injury were higher (14%) for the males in the Meganos population than in the Ohlone population (8%). Larsen (1997) proposes that you would expect to see differing rates of deliberate trauma in two populations engaging in violent conflict. The author states that, "cemetery assemblages representing groups who were the winners would not be expected to exhibit the frequency of injury seen on the losing end of violent encounters" (Larsen 1997:155).

CONCLUSIONS

The hypothesis of this study is that rates of deliberate traumatic injury would be high at CA-ALA-343 and that the intrusion of the Meganos into the SF Bay Area represents a new source of population pressure into an already well populated region that drove an increase in rates of deliberate traumatic injury. I expected to find rates of traumatic higher at CA-ALA-343 than at other contemporaneous sites in the area that did not show evidence of the Meganos Aspect due to the occupation of two cultural groups in the same geographic area at the same time. Unfortunately, the data does not support this theory. Although the rate of deliberate trauma at CA-ALA-343 is high, it is not significantly higher than other locations within the SF Bay Area and throughout California. Many SF Bay Area sites seem to exhibit evidence of small scale, low intensity warfare or feuding characterized by dispersed internments of victims of deliberate trauma (Grady et al 2001, Strother 2003, Wiberg 2002, Wiberg 1984, Pilloud 2003).

The types of deliberate traumatic injury at all of these SF Bay Area sites are similar to those observed in Southern California (Walker 1989, Lambert 1994 and Lambert 1997), the Great Plains (Holliman and Owsley 1994, Olsen and Shipman 1994, Bovee and Owsley 1994) and the West Tenessee Valley (Smith 1997).

It is known that the Middle Period (500 BC - AD 1000) was a time of increased interpersonal conflict in the SF Bay Area (Moratto 2004, Hylkema 2002, Milliken et al 2007). Increasing sedentism and environmental variability are two possible factors leading to this increase (Moratto 2004, Hylkema 2002, Milliken et al 2007). The Meganos aspect seems to be conscripted to what could be termed as familiar habitats (i.e. riparian corridors) as it progressed south into the SFBA from the San Joaquin Sacramento Delta (Fentress 2010, Hylkema 2010). The advent of the Medieval Climatic Anomaly (MCA), a 500 year period of sharp intervals of drought (800 to 1300 AD), would have significantly altered theses environments, resulting in a population movement similar to the one that brought the Meganos or caused the Meganos to retreat.

Social mechanisms other than warfare could have effected the interactions between the Ohlone and the Meganos. Milliken (2003) states that peoples living west central California were tied together through economic relationships and intermarriage. The hybridization of cultural traits of the Meganos as they moved south into the Santa Clara valley suggests both intermarriage and trade with peoples already living in the area.

There are important issues associated with inferring cultural affinity based on burial custom and artifact types. In this case, the Meganos Aspect is a hybrid of Windmiller and Berkeley Pattern traits. The Meganos Aspect is relatively easy to “see” within a

burial area due to differences in burial posture and orientation, meaning they are generally extended and generally have a certain suite of artifacts. However, defining what the Meganos Aspect is geographically and chronologically is difficult as there seems to be much variability. As the Meganos Intrusion spread south over time, the burial orientation and artifact suite becomes more variable, more Berkeley Pattern-like. The only constant seems to be extended burial position, although this may include a very loose flexed position depending on how "extended" is defined. Since it is a hybrid, it contains traits that are shared and so the numbers may be skewed towards the Berkeley Pattern. Spatial and chronological control over data is essential and specific descriptions of artifact suites are necessary to address the subtleties of a hybridized cultural tradition.

Although answering larger questions about the nature of the Meganos Intrusion into the SF Bay Area is desirable, the level of control over chronological data that is required for this type of inquiry is rarely achievable due to time and budget constraints on Cultural Resource Management (CRM) projects. Similarly, the population under study here is an amalgam of three populations excavated at three different times using different methodologies. The level of chronological resolution for each individual for an in-depth study interpersonal violence within the region as it relates to the Meganos Intrusion is lacking.

There are several limitations on the data used in this study. The lack of a final report and map of the San Francisco State University (SFSU) collection makes any spatial analysis impossible. Final reports for the San Jose State University (SJSU) and Archaeor excavations are similarly unavailable. Since most of the data regarding stratigraphy, chronology, area, depth and other basic site parameters were gathered through Cultural Resource Management (CRM) projects and were focused on individual parcels or areas within parcels using differing methodologies, relatively little data is comparable from study to study. Additionally, studies on Meganos populations are rather rare since most archaeology carried out in the SF Bay Area is CRM, and professional archaeologists practice their professions where the work is, and not necessarily where Meganos Intrusion sites are located.

LITERATURE CITED

Andrushko VA, Latham KA, Grady DL, Pastron AG, and Walker PL. 2005. Bioarchaeological evidence for trophy taking in prehistoric Central California. American Journal of Physical Anthropology 127: 375-384

Andrushko VA, Schwitalla AW, and Walker PL. 2010. Trophy-taking and dismemberment as warfare strategies in prehistoric central California. American Journal of Physical Anthropology 141:83-96

Aufderheide AC and Rodríguez-Martin C. 1998. The Cambridge encyclopedia of human paleopathology. Cambridge University press, Cambridge.

Bamforth D. 1994. Indigenous People, Indigenous Violence: Precontact Warfare on the North American Great Plains. Man, Issue 29, March, 95-115.

Beardsley RK. 1948. Cultural sequences in central California. Archaeology American Antiquity, 14(1): 1-29

Bennyhoff J A. 1968. A Delta Intrusion into the Bay in the Late Middle Period in Central California. In Towards a new taxonomic framework for Central California archaeology: essays by JA Bennyhoff and DA Fredrickson, edited by RE Hughes, Number 52, Contributions of the University of California Archaeological Research Facility, Berkeley, CA, 1994.

Bennyhoff J A. 1987. Variation within the Meganos culture. In Towards a new taxonomic framework for central california archaeology: essays by JA Bennyhoff and DA Fredrickson, edited by RE Hughes, Number 52, Contributions of the University of California Archaeological Research Facility, Berkeley, CA, 1994.

Bennyhoff J A and RE Hughes. 1987. Shell bead and ornament exchange networks between California and the Western Great Basin. Anthropological papers of the American museum of natural history 64(2).

Boylston A. 2004. Recording weapons trauma. In Guidelines to the standards for recording human remains, Institute of Field Archaeologists, Paper Number 7, M Brickley and J McKinley eds, BABAO Department of Anthropology, University of Southampton and Institute of Field Archaeologists, University of Reading, UK

Boylston A and Roberts C 1996. The Romano-British cemetery at Kempston, Bedfordshire: report on the human skeletal remains. Calvin Well laboratory, department of archaeological sciences, University of Bradford, Bradford.

Bovee DL and Owsley DW. 1994. Evidence of warfare at the Heerwald Site. In Skeletal biology in the great plains: migration, warfare, health, and subsistence, edited by DW Owsley and RL Jantz, pp 355-362, Smithsonian Institution Press, Washington DC

Broadbent SM. 1972. The Rumsen of Monterey, an ethnography from historical sources. In Miscellaneous Papers on Archaeology, Contributions of the University of California Archaeological Research Facility, Department of Anthropology, University of California, Berkeley, California

Buikstra JE and Ubelaker DH. 1994. Standards for data collection from human skeletal remains. Proceedings of a Seminar at the Field Museum of Natural History, Arkansas Archaeological Survey Research Series No 44, Fayetteville

Chagnon N. 1968. Yanomamo social organization and warfare. In: War. Editors Freid M, Harris M and R Murphy, p 109-159, Natural History Press, Garden City, New York.

Chavez D. 1974. Archaeological impact evaluation of the areas under consideration for enlargement of ponding area – Fremont parking lot enlargement project Bay Area Rapid Transit District (BART). Submitted to BART, 800 Madison Street, Oakland, CA 94607.

Davis JT. 1974. Trade Routes and Economic Exchange among the Indians of California. Ballena Press, Berkeley.

Estes A, Strother E, Brown K, Summerlin N, Pilloud M, Allan J and Self W. 2002. Report on the Catellus Hercules project: data recovery, burial removal and construction monitoring at the site CA-CCO-474/H, Hercules, California: volume II burial recovery and analysis. William Self associates, Orinda.

Fentress JB, London J, Kaye M, and Lopez J. 1999. Final report on San Francisco state university native American graves protection and repatriation act (nagpra) project: cultural affiliation research and final inventory. Department of anthropology, San Francisco state university.

Fentress JB. 2010. Personal communication with author.

Ferguson, RB. 1997. Violence and war in prehistory. In: Troubled times: violence and warfare in the past. D.L.Martin and D.W. Frayer editors. Gordon and Publishers Amsterdam, pp181-326.

Flynn, KS. 1994. A cultural resources evaluation of the California Lakepoint subdivision, walnut avenue at guardino drive (extended), Fremont, Alameda County, California.

Galloway A. 1999. Broken bones: anthropological analysis of blunt force trauma. Charles C Thomas Publishing, Springfield: Illinois

Grady D, Latham KA, Andruschko VA. 2001 Archaeological investigations at CA – SCL- 674, the Rubino site, San Jose, Santa Clara County, California. Volume 2, The human skeletal biology of CA- SCL- 674. Archives of California Prehistory Number 50, Coyote Press, Salinas: California

Griffin MC, Skelton RR. 2000. Laboratory manual for human osteology and forensic anthropology. San Francisco State University, San Francisco, California

Groza RG. 2002. An AMS chronology for central california *olivella* shell beads. Master's thesis, department of anthropology, California state university, San Francisco.

Haglund W D, Connor M and Scott D D. 2002. The effect of cultivation on buried human remains. In advances in forensic taphonomy: method, theory, and archaeological perspectives, edited by WD Haglund and MH Sorg, pp. 133-150. CRC Press, New York.

Hall JT. 1985. Results of an archaeological subsurface testing program at CA-ALA-343. Center for Anthropological Research, San Jose State University San Jose: California.

Hall JT, Jurmain R, Nelson JS. 1988. Preliminary description of cemetery complex at CA-ALA-343. Proceedings of the Society for California Archaeology, pp 321-334, Society for California Archaeology, San Diego

Hamperl H. 1967. The osteological consequences of scalping. In Disease in antiquity: a survey of the disease, injuries and surgery of early populations, edited by D Brothwell and AT Sandison, pp 630-634, Charles C Thomas, Springfield, Illinois

Harris M. 1970. Cows, pigs, wars and wiiches; the riddles of culture. Vintage Books, Random House, New York.

Heizer RF, Whipple MA. 1971. The California Indians: a sourcebook. University of California Press, Berkeley.

Hollimon SA, Owsley DW. 1994. Osteology of the Fay Tolton site: implications for warfare during the Initial Middle Missouri Variant. In Skeletal biology in the great plains: migration, warfare, health, and subsistence pp 345-353, Smithsonian Institution Press, Washington DC, edited by DW Owsley and RL Jantz

Hurlbut SA. 2000. The taphonomy of cannibalism: a review of anthropogenic bone modification in the American Southwest. International Journal of Osteoarchaeology, volume 10, issue 1, Pages 4 – 26.

Hylkema MG. 2002. Tidal marsh, oak woodlands and cultural fluorescence in the southern San Francisco Bay region. Chapter 13 in Catalysts to complexity, late Holocene societies of the California coast, edited by JM Erlandson and TL Jones,

Perspectives in California Archaeology, Volume 6, Cotsen Institute of Archaeology University of California Los Angeles, Los Angeles: California

Hylkema MG. 2006. Personal communication with author

Hylkema MG. 2010. Personal communication with author

Jurmain RD. 1988. Skeletal analysis from CA-ALA-343. Unpublished manuscript, in possession of author.

Jurmain RD. 1991. Paleoepidemiology of trauma in a prehistoric central California population. In Human Paleopathology: current synthesis and future options. DJ Ortner and AC Aufterheide editors. Smithsonian Institution press. Washington.

Jurmain RD. 2001. Paleoepidemiology of trauma in a prehistoric central California population. In Human paleopathology: current syntheses and future options, edited by DJ Ortner and AC Aufderheide, pp 241-248, Smithsonian Institution Press, Washington DC

Jurmain RD, Bellifemine VI. 1997. Patterns of cranial trauma in a prehistoric population from central California. International Journal of Osteoarchaeology 7: 43-50

Katz D and Suchey JM. 1986. Age determination of the male os pubis. American Journal of Physical Anthropology 69: 427-435

King TF. 1968. Site record for CA-ALA-343. On file at Northwest Information Center (NWIC), Rohnert Park, California

Keeley LH.1996. War before civilization. Oxford University Press, New York, New York.

Kroeber AL. 1925. The Handbook of the Indians of California. Smithsonian Institution Bureau of American Ethnology, Bulletin 78, Washington

Kroeber AL. 1965. The Patwin and their neighbors. University of California American Archaeology and Ethnography, Volume 24 (1930-1932), University of California at Berkeley, Reprint by Kraus Reprint Corporation, New York

Lambert PM. 1994. War and peace on the western front: a study of violent conflict and its correlates in prehistoric hunter-gatherer societies of coastal southern California. University of California Santa Barbara, Doctoral dissertation

Lambert PM. 1997. Patterns of violence in prehistoric hunter-gatherer societies of coastal southern California. In Troubled times: violence and warfare in the past. DL Martin and DW Frayer, pp 77-110, Gordon and Breach Publishers, Overseas Publishers Association, Amsterdam.

Lambert PM, Billman BR and Banks L. 2000. Explaining variability in mutilated human bone assemblages from the American Southwest: a case study from the Southern Peidmont of Sleeping Ute Mountain, Colorado International Journal of Osteoarchaeology 10: 49-64.

Lambert PM. 2002. The archaeology of war: a North American perspective. Journal of Archaeological Research 10:207-241.

Larsen SC. 1997. Bioarchaeology: interpreting behavior form the human skeleton. Cambridge University Press, Cambridge.

Leventhal A. 1993. A reinterpretation of some Bay Area shellmound sites: a view from the mortuary complex from CA-ALA-329 the Ryan mound. Masters Thesis, San Jose State University, Department of Social Sciences, San Jose State University

Levy R. 1978. Costanoan. In California, edited by RF Heizer, pp 485-495, Handbook of North American Indians, Volume 8, William C Sturtevant, general editor, Smithsonian Institution, Washington, DC

Lillard JB, Heizer RF and Fenenga F. 1939. An Introduction to the Archaeology of Central California. Sacramento Junior College, Department of Anthropology Bulletin 2.

Lovejoy CO and KG Heiple. 1981. The analysis of fractures in skeletal populations with an example from the Libben site, Ottowa County, Ohio American Journal of Physical Anthropology, 55(4):529-541.

Lovejoy CO, Meindl RS, Pryzbeck TR, Mensforth RP. 1985. Chronological metamorphosis of the auricular surface of the ilium: a new method for the determination of adult skeletal age at death. American Journal of Physical Anthropology 68: 15-28

Lovel N. 1997. Trauma analysis in paleopathology. Yearbook of Physical Anthropology 40:139-170

Marshall CE. 2002. Osteology of CA-ALA-343. Unpublished Manuscript in possession of author

Mason AJ. 1912. The ethnology of the Salinan Indians. University of California Publications in American Archaeology and Ethnology, Volume 10, Number 4, University of California, Berkeley, California

Mc Kale G. 1999. Paleopathology and Demography of a South San Francisco Bay Area Prehistoric Mortuary Complex: CA-ALA- 329. Masters thesis, California State University at Sonoma,California.

McCarthy AK. 2006. Drawings of traumatic injury from CA-ALA-343. In author's possession.

Merbs CF. 1989. Trauma. In Reconstruction of life from the skeleton, edited by M Y Iscan and K A R Kennedy, pp 161-189, Alan R Liss, Inc, New York

Milliken RT. 1995. A time of little choice: the disintegration of tribal culture in the San Francisco Bay Area. 1769-1810 Ballena Press Anthropological Papers Number 43, Menlo Park: Ballena Press

Milliken RT. 2008. Native americans at Mission San Jose. Malki-Ballena Press, Banning, California

Milliken RT and Bennyhoff JA. 1993. Temporal bead changes as prehistoric california grave goods. In There grows a green tree: papers in honor of David A Fredrickson, M Basgall, W Hildebrandt, P Mikkelsen and G White, editors Center for Archaeological Research at Davis Publication No1:381-395

Milliken RT, Fitzgerald RT, Hylkema MG, Groza R, Origer T, Bieling DG, Leventhal A, Wiberg RS, Gottsfield A, Gillette D, Bellifemine V, Strother E, Cartier R, Fredrickson DA. 2007. Punctuated culture change in the San Francisco Bay Area. Chapter 8 in California prehistory: colonization, culture, and complexity. TL Jones and KA Klar, eds Altamira Press, Rowman and Littlefield Publishers, Inc New York

Milner GR, Anderson E, Smith VG. 1991. Warfare in late prehistoric west central Illinois. American Antiquity 56:4 pp 581-603

Moorees CF, Fanning EA, Hunt EE. 1963. Age variation of formation stages for ten permanent teeth. Journal of Dental Research 42: 1490-1502

Moratto M. 2004. California archaeology. 1984 by Academic Press Incorporated, reprinted Coyote Press, Salinas, CA

Novak S. 2000. Battle-related trauma. In blood red roses: the archaeology of a mass grave from the battle of Towton A.D. 1461, edited by V. Fiorato, A.Boylston and C. Knüsel, pp. 90-102. Oxbow Books, Oxford.

Olsen SL and Shipman P. 1994. Cutarks and perimortem treatment of skeletal remains on the Northern Plains. In: Owsley DW and Jantz RL, editors. Skeletal biology in the Great Plains: migration, warfare, health and subsistence. Washington DC: Smithsonian Institution press p 377-390.

Ortner DJ and Putchar WGJ. 1981. Identification of pathological conditions in human skeletal remains. Smithsonian Institution Press, Washington DC

Otterbien KF. 2000. Five feuds: an analysis of homicides in eastern Kentucky in the late nineteenth century. American Anthropologist 102:231-243

Otterbein KF. 2000b. A history of research on warfare in anthropology. American Anthropologist 101(4): 794-805.

Parkman BE. 1980 Site Record for CA-ALA-343. On file at the northwest information center (nwic), Rohnert Park California.

Pastron AG, Clewlow CW and Atkinson PT. 1973. Aboriginal warfare in Northern California: preliminary observations from skeletal material, The Masterkey vol. 47, no. 4, december. Los Angeles, California.

Pastron AG, Allen G and Bellifemine V. 1999. Archaeological Investigations at CA-SCL-674, The Rubino Site, San Jose, Santa Clara County, California, Vol. I Coyote Press Archives of California Prehistory No. 54, Salinas California

Pesnichack LM and Evans SR. 2005. Results of archaeological monitoring and burial recovery; Avignon housing development (CA-SCL-478), Santa Clara County, San Jose, California. Report on file with the northwest information center (nwic) Rohnert Park, California.

Phenice TW. 1969. A newly developed visual method of sexing the os pubis. American Journal of Physical Anthropology 30: 297-302

Pilloud M. 2003. The medieval climatic anomaly and its impact on health in the Pacific Rim: a case study from Canyon Oaks, California. Masters thesis, Ohio State University, Ohio.

Priestley HI. 1937. A historical, political, and natural description of California by Pedro Fages, written for the Viceroy in 1775. Translated by Herbert Ingram Priestley, University of California Press, Berkeley, California

Robarchek C. 1994. Plains warfare and the anthropology of war. In Skeletal biology in the Great Plains: migration, warfare, health, and subsistence, edited by DW Owsley and RL Jantz, Smithsonian Institution Press, Washington DC, pp 355-362.

Roberts C and Manchester K. 1999. The Archaeology of Disease, 2nd Edition, Cornell University Press, Ithaca

Roop W. 1998. A Cultural resources evaluation of the Civic Center Apartments project, Fremont, Alameda County, California Archaeological Resource Service Petaluma, California.

Ryan DJ. 1972. The paleopathology of ALA-328: the relationships among disease, culture, and environment in a California Indian population. Unpublished Master thesis, Department of Anthropology, San Francisco State University

Schwartz JH. 1995. Skeleton keys: an introduction to human skeletal morphology, development, and analysis. Oxford University Press, New York

Smith, MO. 1997. Osteological indications of warfare in the archaic period of the western Tennesse Valley. In Troubled times: violence and warfare in the past. DL Martin and DW Frayer, pp 241-266, Gordon and Breach Publishers, Overseas Publishers Association, Amsterdam.

Standen VG, Arriaza BT. 2000. Trauma in the pre-ceramic costal populations of northern Chile: violence or occupational hazard? American Journal of Physical Anthropology 112:239-249

Strother E. 2003. Songs of insult: study of perimortem cutmarks on human bone at CA-CCO-474/H Masters Thesis, California State University, Hayward CA

Suchey J M, Wisely DV and Katz D.1988. Instructions for the Suchey-Brooks system for age determination of the os pubis, instructional materials accompanying pubic symphyseal models of the Suchey-Brooks system, Fort Collins.

Tenney JA. 1986. Trauma among early California populations. American journal of physical anthropology 69:271.

Thompson R. 2005. Draft mortuary treatment at CA-ALA-343. Unpublished manuscript in possession of author.

Todd TW. 1921. Age changes in the pubic bone I: The white male pubis. American Journal of Physical Anthropology 3: 285-334

Turney-High H. 1991. Primitive war: its practice and concepts. 2nd edition, Columbia: South Carolina University press.

Ubelaker DH. 1989. Human skeletal remains: excavation, analysis, interpretation. Second Edition, Taraxacum, Washington DC

United States Geological Survey (USGS). 1968. 7.5-minute Niles Quadrangle.

Walker PL. 2001. A Bioarchaeological perspective on the history of violence, Annual Review of Anthropology: 30, pp 573-596

Walker PL. 1989. Cranial injuries as evidence of violence in prehistoric southern California American Journal of Physical Anthropology 80:313-323.

Walker PL and Steckel R. 2002. A western hemisphere perspective on the history of violence. American Journal of Physical Anthropology Annual Meeting Issue 2002: Supplement 34.

Wiberg RS. 1984. The Santa Rita village mortuary complex: evidence and implications of a Meganos intrusion. Masters Thesis, San Francisco State University, San Francisco.

Wiberg RS. 1990. Report of archaeological mechanical testing for the proposed Central Park Development, Fremont, Alameda County, Holman and Associates, San Francisco, California.

Wiberg RS. 1998. Report of archaeological monitoring and excavations at CA-ALA-343 east of the tule pond within the project area of the MH Podell Company, Presedio apartments phase I, Fremont California. Holman and associates, San Francisco, California.

Wiberg RS. 2002. Archaeological investigations; Skyport plaza phase I (CA-SCL-478), San Jose, Santa Clara County California. Holman and associates, San Francisco, California.

White TM. 1992. Prehistoric cannibalism at Mancos 5MTUMR-2346. Princeton University Press, Princeton: New Jersey

White TM, Folkens PA. 1991. Human osteology. Academic Press, Inc, San Diego

Wildesen L. 1968. Preliminary report of archaeological investigations at CA-ALA-343, San Francisco State College, San Francisco: California, no page numbers

Wildesen L. 1970. Temporal and areal relations in Alameda County, California. Master's Thesis, San Francisco State College, San Francisco: California

Wildesen L. 2006. Personal communication with author

Willey P. 1990. Prehistoric warfare on the Great Plains, skeletal analysis of the Crow Creek massacre victims. Garland Publishing Incorporated, New York

Wright Q. 1964. A study of war. Vol 1. University of Chicago Press. Chicago.

APPENDICES

APPENDIX A: CA-ALA-343 Data

Table 23. Select data from CA-ALA-343.

Olivella bead types from Bennyhoff and Hughes 1987.

F= fetal (*In Utero)*, I = Infant (Birth To Three Years), C= Child (Four To Twelve Years), AO= Adolescent (Thirteen To Seventeen Years), YA= Young Adult (Eighteen To Twenty Five Years), YMA = Young Middle Adult (Twenty Six To Thirty Five Years), MIA= Middle Adult (Thirty Six To Forty Five), MA= Mature Adult (Forty Six And Older), A= Adult (Over Twenty Five, All Epiphyses Fused)

F=Female, PF=Possible Female, I= Indeterminate , PM=Possible Male, M=Male

No = New number assignment, B=Burial, S=Sex, A= Age, Art = Artifacts Associated with Burial

DI = Disposition, V=Ventral, D=Dorsal, L=Lateral, EX = Excavation

CA = Cultural Affiliation, O = Ohlone, M = Meganos, EXT=Extended

NDT= Non-deliberate Truama, DT= Deliberate Trauma

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
1	1	I	A				Na	yes		SJSU 1985
2	2	I	A				Na	yes		SJSU 1985
3	3	I	A				Na			SJSU 1985
4	3a	I	A				Na			SJSU 1985
5	4	PF	A				Na			SJSU 1985
6	4a	I	YA	healed fracture of proximal hand phalanx, ante-mortem			Na			SJSU 1985
7	5	I	INF				Na	yes		SJSU 1985

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
8	6	I	YA				Na			SJSU 1985
9	7	I	A			D	Loose Flexed	yes	O	SJSU 1985
10	8	PM	A				Na	yes		SJSU 1985
11	9	I	A				Na			SJSU 1985
12	10	PF	A				Na	yes		SJSU 1985
13	11	PF	A				Na			SJSU 1985
14	12	I	A			L	Flexed	yes	O	SJSU 1985
15	13	PM	YMA		Projectile point em-bedded in left femur, posterior of surgical neck. Well healed but with path-ological changes to ace-tabulum.	V	EXT	yes	M	SJSU 1985
16	14	PM	YMA			V	EXT	yes	M	SJSU 1985
17	15	PM	YMA			V	EXT	yes	M	SJSU 1985
18	16	PF	A			L	Flexed	yes	O	SJSU 1985
19	17	PF	A			L	Tight Flexed	yes	O	SJSU 1985
20	18	M	YMA			V	EXT	yes	M	SJSU 1985

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
21	18a	I	A				Na			SJSU 1985
22	19	F	YA			V	Loose Flexed	yes	O	SJSU 1985
23	20	I	A				Na	yes		SJSU 1985
24	21	I	NA				Na			SJSU 1985
25	22	I	YMA			V	EXT	yes	M	SJSU 1985
26	23	M	YMA			V	EXT	yes	M	SJSU 1985
27	24	M	YA			V	EXT	yes	M	SJSU 1985
28	25a	I	A				Na	yes		SJSU 1985
29	25b	I	AO				Na			SJSU 1985
30	26	I	C			D	EXT	yes	M	SJSU 1985
31	27	PF	YA			D	EXT	yes	M	SJSU 1985
32	28	I	C			V	Semi EXT	yes	M	SJSU 1985
33	29	PF	AO			L	Tight Flexed	yes	O	SJSU 1985
34	30	PF	A			L	Loose Flexed	yes	O	SJSU 1985
35	31	F	AO			V	Semi EXT		M	SJSU 1985
36	32	M	YA	healed fracture of proximal hand phalanx		L	Tight Flexed	yes	O	SJSU 1985
37	32a	I	A				Na			SJSU 1985
38	32b	I	C				Na			SJSU 1985

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
39	34	PM	AO			L	Flexed	yes	O	SJSU 1985
40	35	F	YA			V	Loose Flexed		O	SJSU 1985
41	36	F	MIA			D	Loose Flexed		O	SJSU 1985
42	37	I	C			L	Flexed		O	SJSU 1985
43	38	PM	A				Na	yes t		SJSU 1985
44	39	M	A			V	EXT	yes	M	SJSU 1985
45	40	F	MIA			V	EXT		M	SJSU 1985
46	41	I	A				Na	yes		SJSU 1985
47	42	M	YMA	ununited fracture of left radius and ulna, healed		V	EXT	yes	M	SJSU 1985
48	43	F	MIA			L	Flexed	yes	O	SJSU 1985
49	42a	I	C				Na			SJSU 1985
50	42/ 43b	I	IND				Na			SJSU 1985
51	42/ 43c	I	IND				Na			SJSU 1985
52	44	I	A			L	Flexed		O	SJSU 1985
53	44a	I	A				Na			SJSU 1985
54	45	I	A			L	Flexed		O	SJSU 1985
55	46	PF	A			L	Flexed	yes	O	SJSU 1985
56	47	M	YA			L	Tight Flexed	yes	O	SJSU 1985

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
57	48	M	YMA			V	EXT	yes	M	SJSU 1985
58	49	I	C			V	EXT	yes	M	SJSU 1985
59	50	I	C				Na	yes		SJSU 1985
60	51	I	C				Na	yes		SJSU 1985
61	52	F	MIA	fracture of left tibia with associated severe periostitis		L	Flexed	yes	O	SJSU 1985
62	53	M	YA			L	Flexed	yes	O	SJSU 1985
63	54	I	A				Na	yes		SJSU 1985
64	55	PM	A			L	Loose Flexed	yes	O	SJSU 1985
65	56	I	A				Na	yes		SJSU 1985
66	57	PF	A			L	Flexed	yes	O	SJSU 1985
67	58/ 60	I	A				Na			SJSU 1985
68	59	F	MIA			V	Semi EXT	yes	M	SJSU 1985
69	60	I	C				Na			SJSU 1985
70	61	PF	MIA	fractured right rib, healed		V	Loose Flexed		O	SJSU 1985
71	62	M	MIA			L	Tight Flexed	yes	O	SJSU 1985
72	63	I	C				Na			SJSU 1985
73	64	I	AO			V	Tight Flexed		O	SJSU 1985
74	65	PF	AO			L	Flexed		O	SJSU 1985

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
75	66	I	A				Na			SJSU 1985
76	67	I	C				Na	yes		SJSU 1985
77	68	F	A				Na			SJSU 1985
78	69	I	C				Na	yes		SJSU 1985
79	69a	I	IND				Na			SJSU 1985
80	71	I	A				Na			SJSU 1985
81	72	F	YA				Na			SJSU 1985
82	1a	I	A				Na			1968 SFSU
83	1b	I	A				Na			1968 SFSU
84	2a	F	YA		Depres-sion fracture right and left parietals on sagittal suture, ante-mortem		Na			1968 SFSU
85	2b	M	A				Na			1968 SFSU
86	2c	PF	A				Na			1968 SFSU
87	2d	I	AO				Na			1968 SFSU
88	2e	I	C				Na			1968 SFSU
89	3a	F	A				Na			1968 SFSU
90	3b	F	YA				Na			1968 SFSU

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
91	3c	I	A				Na			1968 SFSU
92	5a	I	YA				Na			1968 SFSU
93	5b	I	A				Na			1968 SFSU
94	7	I	A				Na			1968 SFSU
95	8a	PM	A		Well healed depression fractures right parietal, ante-mortem		Na			1968 SFSU
96	8b	M	A		projectile wound on right parietal with some healing, ante-mortem		Na			1968 SFSU
97	8c	M	YA		cutmarks on disto-lateral humerus, peri-mortem		Na			1968 SFSU
98	11	F	YA				Na			1968 SFSU
99	12a	F	YA				Na			1968 SFSU
100	12b	I	C				Na			1968 SFSU
101	G7	I	YA				Na			1968 SFSU

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
102	Unk 1 A	PF	YA				Na			1968 SFSU
103	Unk 1 B	PF	YA				Na			1968 SFSU
104	Unk 1 C	PF	YA				Na			1968 SFSU
105	Unk 1 D	I	YA				Na			1968 SFSU
106	Unk 1 E	I	A	fused 1st and 2nd right meta-tarsals			Na			1968 SFSU
107	Unk 1 F	I	MIA				Na			1968 SFSU
108	Unk 1 G	I	MIA	sternal 1st rib end and manu-brium with sclerotic bone formation			Na			1968 SFSU
109	Unk 1 H	PM	YA		cutmarks on medial right humerus		Na			1968 SFSU
110	Unk 2	I	AO				Na			1968 SFSU
111	Unk 3 A	I	A				Na			1968 SFSU
112	Unk 3 B	I	AO				Na			1968 SFSU

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
113	Unk 4	I	C		cutmarks on the distal surface of the right fibula		Na			1968 SFSU
114	Unk 5	I	INF				Na			1968 SFSU
115	1	M	MA	healed parry fracture	two well healed depression fractures on the sagittal suture, antemortem blunt force trauma	V	Semi EXT	yes	M	Archaeor 2000
116	2	F	MIA			V	Flexed	yes	O	Archaeor 2000
117	3	I	C			V	Flexed	yes	O	Archaeor 2000
118	4	I	A			L	Tight Flexed		O	Archaeor 2000
119	5	M	YMA	posterior compres-sion fracture of un-identified lumbar vertebrae			Na	yes		Archaeor 2000
120	6	I	AO				Na			Archaeor 2000
121	7	I	C				Na			Archaeor 2000
122	8	PM	YA			D	Tight Flexed		O	Archaeor 2000
123	9	PF	YA			L	Tight Flexed		O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
124	10	PM	MA			L	Tight Flexed	yes	O	Archaeor 2000
125	11	I	AO			L	Flexed		O	Archaeor 2000
126	12	I	YMA			D	Loose Flexed		O	Archaeor 2000
127	13a	M	YA				Sec	yes		Archaeor 2000
128	13b	I	A				Sec			Archaeor 2000
129	13c	I	AO				Sec			Archaeor 2000
130	14	I	A			L	Tight Flexed		O	Archaeor 2000
131	15	I	A			L	Tight Flexed	yes	O	Archaeor 2000
132	16	I	C	smooth porous bone lesion affecting temporal process of the right zygomatic and the right maxillary alveolar process, suggestive of response to un-identified pathogen or a traumatic injury		L	Tight Flexed	yes	O	Archaeor 2000
133	17	I	MIA			L	Tight Flexed		O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
134	18	I	MA			L	Flexed	yes	O	Archaeor 2000
135	19	I	A				Na			Archaeor 2000
136	20	I	A	Ante-mortem fracture of the left ulna, located midshaft with callus			Na			Archaeor 2000
137	21	I	C			D	Semi EXT		M	Archaeor 2000
138	22	M	YMA			L	Flexed		O	Archaeor 2000
139	23	I	YMA	cervical vertebrae compression fracture, 2 un-identified left rib fragments with ante-mortem transverse fracturing		L	Flexed		O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
140	24	F	MA	12th thoracic and 1st lumbar compres-sion fracture, neural arch of 5th lumbar vertebrae was separated due to ante-mortem fracturing		V	EXT		M	Archaeor 2000
141	25	I	INF				Na	yes		Archaeor 2000
142	26	M	YMA		15 peri-mortem cutmarks on right 4th rib suggests 12 ap-plications of sharp force trauma, in addition to a shearing fracture posterior to cutmarks	V	EXT	yes	M	Archaeor 2000
143	27	I	A				Na			Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
144	28	F	MA	right 5th meta-carpal ante-mortem fracture, well healed		V	Loose Flexed		O	Archaeor 2000
145	29	PF	MA	4th cervical vertebrae sustained ante-mortem com-pression fracturing		L	Loose Flexed		O	Archaeor 2000
146	30	M	YMA	4th cervical, 11th and 12th thoracic, 2nd lumbar have ante-mortem com-pression fractures and spon-dylosis		V	Semi EXT		M	Archaeor 2000
147	31	F	MA			L	Flexed		O	Archaeor 2000
148	32	I	AO			D	Na			Archaeor 2000
149	33	I	AO			L	Tight Flexed		O	Archaeor 2000
150	34	I	A				Na			Archaeor 2000
151	35	PF	YA				Na			Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
152	36	I	AO			V	Loose Flexed	yes	O	Archaeor 2000
153	37	M	YA			V	EXT	yes	M	Archaeor 2000
154	38	PM	A				Na			Archaeor 2000
155	39	F	MA	oblique ante-mortem fracture on 11th rib		D	Flexed	yes	O	Archaeor 2000
156	40	I	C			L	Loose Flexed		O	Archaeor 2000
157	41	PF	YA			L	Flexed		O	Archaeor 2000
158	42	F	YMA	anterior compres-sion fracture of the 5th cervical vertebrae		L	Loose Flexed	yes	O	Archaeor 2000
159	43	M	YMA			L	Tight Flexed	yes	O	Archaeor 2000
160	44	I	C				Na			Archaeor 2000
161	45	I	A				Na			Archaeor 2000
162	46	PM	MIA			V	Tight Flexed	yes	O	Archaeor 2000
163	47	I	MA			L	Loose Flexed		O	Archaeor 2000
164	48	PM	MA			L	Tight Flexed		O	Archaeor 2000
165	49	I	MA			L	Loose Flexed		O	Archaeor 2000
166	50	F	YMA			L	Tight Flexed	yes	O	Archaeor 2000
167	51	I	AO				Na	yes		Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
168	52	I	C				Na			Archaeor 2000
169	53	I	A		Ante-mortem blunt force trauma 3 small ante-mortem depres-sion fractures on parietals, sharp force trauma 2 deep peri-mortem cutmarks on parietal		Na			Archaeor 2000
170	54	I	A				Na			Archaeor 2000
171	55	I	A				Na			Archaeor 2000
172	56	PM	A			D	Tight Flexed		O	Archaeor 2000
173	57	I	A				Na			Archaeor 2000
174	58	I	A				Na			Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
175	59	PF	MA	facet on inferior surface of left clavicle, could represent a con-genital mal-formation or the result of traumatic injury		L	Flexed	yes	O	Archaeor 2000
176	60	I	MA				Na	Mi ca, Hal ioti s		Archaeor 2000
177	61	I	AO	exostosis diagnosis as possible healed avulsion fracture of the medial plantar surface of the midshaft of the 5th left metatarsal		D	Tight Flexed		O	Archaeor 2000
178	62	PM	YA			V	EXT	yes	M	Archaeor 2000
179	63	I	MA			L	Flexed		O	Archaeor 2000
180	64	PF	MA			L	Tight Flexed		O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
181	65	I	A				Na			Archaeor 2000
182	66	I	A				Na			Archaeor 2000
183	67	I	A				Na			Archaeor 2000
184	68	I	YMA				Na			Archaeor 2000
185	69	PM	MA			D	Loose Flexed		O	Archaeor 2000
186	70	I	A			L	Tight Flexed		O	Archaeor 2000
187	71	I	MA	avulsion fracture to the muscle and ligament attach-ments of the proximal tibio-fibular joint			Na			Archaeor 2000
188	72	PF	MA	fracture acromial end left clavicle well healed		L	Tight Flexed		O	Archaeor 2000
189	73	I	YA			L	Tight Flexed		O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
190	74	I	AO		5 peri-mortem cutmarks visceral surface on 4th or 5th ribs suggests 5 ap-plications of sharp force trauma	L	Tight Flexed	yes	O	Archaeor 2000
191	75	I	A				Na			Archaeor 2000
192	76	I	YMA				Na			Archaeor 2000
193	77	PM	MA			L	Tight Flexed		O	Archaeor 2000
194	78	PM	MA				Na			Archaeor 2000
195	79	PF	MA				Na			Archaeor 2000
196	80	PF	YA				Sec			Archaeor 2000
197	81	PM	MA				Sec	yes		Archaeor 2000
198	82	PF	MA			V	EXT		M	Archaeor 2000
199	83	I	C	Ante-mortem compres-sion fracture of the 3rd lumbar vertebrae		V	Na	yes		Archaeor 2000
200	84	I	YA			V	EXT	yes	M	Archaeor 2000
201	85	I	MIA				Na	yes		Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
202	86	M	YMA	Spondylo -sis 5th lumbar vertebrae		D	EXT		M	Archaeor 2000
203	87	M	MA			V	EXT	yes	M	Archaeor 2000
204	88	PM	MA			V	EXT	yes	M	Archaeor 2000
205	89	I	AO			V	EXT	yes	M	Archaeor 2000
206	90	PM	A		obsidian point embedded in left L 9th thoracic vertebrae with hinged fracture, peri-mortem projectile wound	V	EXT	yes	M	Archaeor 2000
207	91	PM	MA			V	Loose Flexed	yes	O	Archaeor 2000
208	92	F	MA		3 peri-mortem chopmark superior right 1st rib	L	Flexed	yes	O	Archaeor 2000
209	93	I	C			L	Flexed	yes	O	Archaeor 2000
210	94	PF	MA			L	Tight Flexed	yes	O	Archaeor 2000
211	95	M	MIA			V	EXT	yes	M	Archaeor 2000
212	96	M	MA			V	EXT	ye	M	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
213	97	I	AO	Spondylo -sis of 4th lumbar vertebrae		V	EXT	yes	M	Archaeor 2000
214	98	F	YMA			V	EXT	yes	M	Archaeor 2000
215	99	I	A	left ulna monteggi a fracture, radial notch appears displaced		V	EXT	yes	M	Archaeor 2000
216	100	I	MA			L	Tight Flexed		O	Archaeor 2000
217	101	I	YMA			V	Loose Flexed		O	Archaeor 2000
218	102	I	C				Na			Archaeor 2000
219	103	M	MA	left ulna and radius healed non union fractures on distal ends	4 ante-mortem depress-sion fractures on parietal squamae (2 on left, 2 on right) showed some healing, 4 healed cutmarks on left L mandible and ascending ramus	V	Semi EXT		M	Archaeor 2000
220	104	I	A				Na			Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
221	105	M	MA		Depress-sion fracture on right frontal eminence, ante-mortem	D	Tight Flexed		O	Archaeor 2000
222	106	PM	YMA		obsidian point embedded in posterior surface left illium, peri-mortem and no healing	D	Loose Flexed		O	Archaeor 2000
223	107	I	YA			L	Tight Flexed		O	Archaeor 2000
224	108	F	YMA			L	Flexed		O	Archaeor 2000
225	109	I	MIA				Na			Archaeor 2000
226	110	I	C				Na			Archaeor 2000
227	111	I	YA			L	Tight Flexed		O	Archaeor 2000
228	112	I	C			V	Loose Flexed		O	Archaeor 2000
229	113	M	MIA			L	Flexed	yes	O	Archaeor 2000
230	114	M	MA			L	Flexed		O	Archaeor 2000
231	115	M	MIA				Na			Archaeor 2000
232	116	PM	YMA			L	Tight Flexed		O	Archaeor 2000
233	117	PM	MA			L	Tight Flexed		O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
234	118	I	MA			D	Tight Flexed		O	Archaeor 2000
235	119	I	YMA	Ante-mortem right rib fracture with signs of healing		D	Tight Flexed		O	Archaeor 2000
236	120	F	YMA			V	EXT	yes	M	Archaeor 2000
237	121	F	MA			V	Loose Flexed		O	Archaeor 2000
238	122	PF	MA				Na			Archaeor 2000
239	123	M	YMA			L	Tight Flexed	yes	O	Archaeor 2000
240	124	PM	MA			D	Loose Flexed		O	Archaeor 2000
241	125	PM	YA			L	Flexed	yes	O	Archaeor 2000
242	126	PM	A	the right humerus sustained a peri-mortem com-minuted fracture, on the middle 3rd of the shaft with no healing, also a compres-sion fracture to an un-identified cervical vertebrae.		D	Na			Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
243	127	I	AO				Na			Archaeor 2000
244	128	M	YA			D	Na			Archaeor 2000
245	129	M	YMA			Other	Loose Flexed		O	Archaeor 2000
246	130	F	MA	5th lumbar sustained ante-mortem compres-sion fracture		L	Tight Flexed		O	Archaeor 2000
247	131	M	YMA	Ante-mortem avulsion fracture was possible sustained by right navicular although a diferential diagnosis could be argued for con-genital mal-formation resulting from os tibiaie externum (clubfoot)		V	EXT	yes	M	Archaeor 2000
248	132	PM	MA			D	Tight Flexed		O	Archaeor 2000
249	133	I	AO			L	Loose Flexed		O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
250	134	F	YA			L	Loose Flexed		O	Archaeor 2000
251	135	PF	MIA			V	Tight Flexed	yes	O	Archaeor 2000
252	136	F	MA	5th lumbar sustained ante-mortem compres-sion fracture		L	Tight Flexed		O	Archaeor 2000
253	137	PF	YA			L	Tight Flexed		O	Archaeor 2000
254	138	M	MIA			L	Tight Flexed		O	Archaeor 2000
255	139	I	C			D	Tight Flexed	yes	O	Archaeor 2000
256	140	I	MIA			L	Tight Flexed		O	Archaeor 2000
257	141	PF	MIA	Ante-mortem fracture on left mandib. condyle		D	Tight Flexed		O	Archaeor 2000
258	142	PM	YMA			L	Tight Flexed	yes	O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
259	143	M	MA	large convex articular tubercule located on the left L surface of the dens of the axis vertebrae, may represent pseudo-arthritis which developed from ante-mortem fracturing of the dens prior to fusion		Other	Tight Flexed	yes	O	Archaeor 2000
260	144	I	MA			L	Tight Flexed	yes	O	Archaeor 2000
261	145	PM	MA			L	Tight Flexed		O	Archaeor 2000
262	146	I	MA			L	Tight Flexed		O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
263	147	PF	MA	bony spur on middle third of humeral shaft, traumatic myositis ossificans at the insertion of the deltoid muscle		L	Tight Flexed		O	Archaeor 2000
264	148	PM	MA			L	Flexed	yes	O	Archaeor 2000
265	149	PM	MA			V	Flexed		O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
266	150	I	AO		3 peri-mortem stab wounds lower thorax and pelvic region, circular hole perforated the body of the 10th thoracic vertebrae, 5th lumbar vertebrae affected by 2 ap-plications of sharp force trauma	L	Flexed		O	Archaeor 2000
267	151	F	YA		Peri-mortem high velocity projectile wound posterior aspect 9th thoracic vertebrae, back to front, no healing	L	Flexed		O	Archaeor 2000
268	152	I	C			V	Tight Flexed	yes	O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
269	153	F	YA			L	Loose Flexed		O	Archaeor 2000
270	154	I	INF				Na			Archaeor 2000
271	155	I	MA			L	Flexed		O	Archaeor 2000
272	156	I	C			L	Loose Flexed	yes	O	Archaeor 2000
273	157	I	A			L	Tight Flexed	yes	O	Archaeor 2000
274	158	I	C			L	Tight Flexed		O	Archaeor 2000
275	159	I	AO			L	Flexed	yes	O	Archaeor 2000
276	160	F	YMA			V	EXT	yes	M	Archaeor 2000
277	161	I	MA			L	Flexed		O	Archaeor 2000
278	162	M	MA	anterior half of hamate hamulus was absent, the reduced hamulus was normal, may represent ante-mortem avulsion fracture or con-genital mal-formation		V	Semi EXT	yes	M	Archaeor 2000
279	163	F	YA			V	EXT		M	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
280	164	I	MA		right frontal depress-sion fracture, well healed	V	Semi EXT		M	Archaeor 2000
281	165	F	MA			L	Tight Flexed		O	Archaeor 2000
282	166	M	MA			V	Tight Flexed		O	Archaeor 2000
283	167	F	MIA			V	EXT		M	Archaeor 2000
284	168	F	MA	Spondylo -sis 5th lumbar vertebrae, non union of left pars inter-articularis		V	Loose Flexed	yes	O	Archaeor 2000
285	169	PF	MA			L	Tight Flexed		O	Archaeor 2000
286	170	I	MA			L	Tight Flexed		O	Archaeor 2000
287	171	F	MA			D	Tight Flexed		O	Archaeor 2000
288	172	I	INF				Na			Archaeor 2000
289	173	PF	MA	displaced fracture of left first meta-carpal, distal two thirds		L	Tight Flexed	yes	O	Archaeor 2000
290	174	I	A			L	Flexed		O	Archaeor 2000
291	175	F	YA			L	Tight Flexed	yes	O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
292	176	F	MA			V	EXT	yes	M	Archaeor 2000
293	177	M	YMA			V	EXT		M	Archaeor 2000
294	178	I	MA			L	Tight Flexed		O	Archaeor 2000
295	179	PM	A			L	Flexed		O	Archaeor 2000
296	180	F	YA	medial left ulna shaft lytic lesions, possible trauma		V	Loose Flexed		O	Archaeor 2000
297	181	I	A				Na			Archaeor 2000
298	182	PM	MA		healed oval shape depress-sion fracture on left side of frontal, ante-mortem	L	Tight Flexed		O	Archaeor 2000
299	183	M	YMA		shallow peri-mortem cutmarks on left supraorbit-al ridge, 2 ap-plications of sharp force trauma	L	Tight Flexed		O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
300	184	F	MIA	5th lumbar sustained ante-mortem compres-sion fracture with kyphosis of lumbar spine		D	Tight Flexed		O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
301	185	M	YMA		U shaped furrow present left L 7th thoracic vertebrae projectile wound with no healing. A second projectile wound was observed on the posterior surface of the left illium, an oval shaped lesion with adhering bone tissue on the medial and superior-medial margins, no healing evident.	V	EXT	yes	M	Archaeor 2000
302	186	I	C			L	Flexed		O	Archaeor 2000
303	187	I	AO				Na			Archaeor 2000
304	188	I	YA				Na			Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
305	189	PM	MA			L	Loose Flexed		O	Archaeor 2000
306	190	I	YA				Na			Archaeor 2000
307	191	PM	MIA			L	Tight Flexed		O	Archaeor 2000
308	192	PM	MA	the middle third of the left radial shaft sustained an ante-mortem non union fracture and an un-identified lumbar vertebrae sustained a compres-sion fracture		L	Tight Flexed		O	Archaeor 2000
309	193	I	A			L	Tight Flexed		O	Archaeor 2000
310	194	M	YMA			D	EXT		M	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
311	195	PM	YMA		Remodeling lesions of left and right parietals, possible healed depression fractures or porotic hyperstosis, antemortem blunt force trauma	L	Flexed		O	Archaeor 2000
312	196	F	MA			L	Tight Flexed		O	Archaeor 2000
313	197	M	MA			V	Tight Flexed		O	Archaeor 2000
314	198	I	A			D	EXT		M	Archaeor 2000
315	199	I	A			D	EXT		M	Archaeor 2000
316	200	PF	MA			V	Loose Flexed		O	Archaeor 2000
317	201	M	YMA	Antemortem fracture right fibula, healed with dis placement		L	Loose Flexed		O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
318	202	I	AO	1st thoracic vertebrae ante-mortem clay shoveler's fracture to the spinous process	Ante-mortem scalping, a roughly circular lesion spanning the apex of the left and right parietal exhibiting billowing and hypervas-culization 12 small divets were located on the right parietal within the anterior margin of the lesion. A thin concaved plate of bone recoved with the individual the plate fit to the contours of the lesion.	V	Loose Flexed	yes	O	Archaeor 2000
319	203	I	A				Na			Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
320	204	I	AO			L	Tight Flexed		O	Archaeor 2000
321	205	I	A			L	Tight Flexed		O	Archaeor 2000
322	206	PM	A			V	Tight Flexed		O	Archaeor 2000
323	207	M	YMA			V	EXT	yes	M	Archaeor 2000
324	208	F	YA				Na	yes		Archaeor 2000
325	209	I	YA			V	EXT	yes	M	Archaeor 2000
326	210	I	YA			V	EXT		M	Archaeor 2000
327	211	I	YMA			D	Semi EXT		M	Archaeor 2000
328	212	PF	MA			D	Semi EXT		M	Archaeor 2000
329	213	I	INF				Na			Archaeor 2000
330	214 a	I	A				Sec			Archaeor 2000
331	214 b	PF	A				Sec			Archaeor 2000
332	215	I	A				Na			Archaeor 2000
333	216	I	A				Na			Archaeor 2000
334	217	M	MIA			V	Tight Flexed		O	Archaeor 2000
335	218	F	MA	right 11th rib has ante-mortem fracture, healing		L	Tight Flexed		O	Archaeor 2000
336	219	PM	MIA			L	Tight Flexed		O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
337	220	I	MIA		large ante-mortem depress-sion fracture to left parietal	V	EXT	yes		Archaeor 2000
338	221	I	MA			L	Tight Flexed		O	Archaeor 2000
339	222	F	YMA			L	Flexed		O	Archaeor 2000
340	223	PM	MIA	Ante-mortem parry fracture on left ulna		L	Tight Flexed		O	Archaeor 2000
341	224	F	YA			V	EXT	yes	M	Archaeor 2000
342	225	F	YA			V	EXT		M	Archaeor 2000
343	226	F	YMA			V	EXT		M	Archaeor 2000
344	227	I	INF			L	Tight Flexed	yes	O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
345	228	F	YMA		Peri-mortem cutmark on anterior surface of left clavicle, suggests single sharp force traumatic episode, with blade sheen and twig peel	V	Flexed		O	Archaeor 2000
346	229	I	C				Na	yes		Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
347	230	M	YA		Obsidian biface located posterior illiac, did not impact the illiac fossa but irritated peri-osteum into forming a pro-liferation of lobular schlerotic bone holding point in place, ante-mortem	L	Tight Flexed	yes		Archaeor 2000
348	231	F	YMA			V	Loose Flexed	yes	O	Archaeor 2000
349	232	I	INF			V	EXT	yes	M	Archaeor 2000
350	233	I	C			L	Flexed	yes	O	Archaeor 2000
351	234	F	YMA			V	Loose Flexed	yes	O	Archaeor 2000
352	235	PF	MA			L	Flexed		O	Archaeor 2000
353	236	I	A			L	Flexed		O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
354	237	F	YMA	right 4th rib has ante-mortem fracture, 3rd and 4th thoracic vertebrae fused ankylosed	2nd lumber vertebrae has oval shaped hole indicative of peri-mortem projectile injury to spine	L	Loose Flexed		O	Archaeor 2000
355	238	I	MA			L	Tight Flexed	yes	O	Archaeor 2000
356	239	I	A			V	EXT		M	Archaeor 2000
357	240	I	MIA			L	Tight Flexed		O	Archaeor 2000
358	241 a	I	A				Na			Archaeor 2000
359	241 b	I	A				Na			Archaeor 2000
360	242	PF	MA	Compres-sion fracture on 7th cervical vertebrae, most likely from hyper-flexion of neck and head		D	Flexed		O	Archaeor 2000
361	243	I	C			D	Tight Flexed	yes	O	Archaeor 2000
362	244	F	YMA			D	Loose Flexed	yes	O	Archaeor 2000
363	245	I	C			L	Tight Flexed		O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
364	246	PM	MA	Ante-mortem compres-sion fractures 5th or 6th cervical vertebrae		V	Tight Flexed		O	Archaeor 2000
365	247	M	MA	3rd through 6th cervical vertebrae compres-sion fractures		L	Tight Flexed		O	Archaeor 2000
366	248	PF	MA			L	Tight Flexed		O	Archaeor 2000
367	249	I	A				Sec	yes		Archaeor 2000
368	250	I	YA				Na	yes		Archaeor 2000
369	251	I	YMA				Na			Archaeor 2000
370	252	I	C				Sec	yes		Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
371	253	F	YMA	Compression fractures 3rd through 10th thoracic vertebrae associated with hyperflexion or axial overloading, diagnosed as spondylosis deformans and degenerative joint disease		L	Tight Flexed	yes	O	Archaeor 2000
372	254	F	MA	distal third of left radial shaft sustained antemortem oblique fracture		V	Tight Flexed		O	Archaeor 2000
373	255	I	A			V	Tight Flexed	yes	O	Archaeor 2000
374	256	I	MA			L	Flexed		O	Archaeor 2000
375	257	I	A				Na			Archaeor 2000
376	258	I	A			L	Tight Flexed	yes	O	Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
377	259	M	MA	Compres-sion fracture on 11th thoracic vertebrae, spon-dylosis		L	Tight Flexed		O	Archaeor 2000
378	260	I	INF				Na			Archaeor 2000
379	261	I	A			L	Tight Flexed		O	Archaeor 2000
380	262	PF	A	left 12th rib sustained ante-mortem fracture		D	Tight Flexed		O	Archaeor 2000
381	263	M	MA	sclerotic bridging of 1st 2nd and 3rd right meta-tarsals, ante-mortem parry fracture of the right ulna		D	Tight Flexed		O	Archaeor 2000
382	264	PF	MIA			L	Flexed	yes	O	Archaeor 2000
383	265	F	MIA			L	Tight Flexed		O	Archaeor 2000
384	266	I	AO			D	EXT	yes	M	Archaeor 2000
385	267	I	AO			D	EXT	yes	M	Archaeor 2000
386	268	I	AO				Na			Archaeor 2000

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
387	269	PM	YMA			L	Flexed	yes	O	Archaeor 2000
388	270	I	MA			L	Tight Flexed		O	Archaeor 2000
389	1	I	C			V	Tight Flexed		O	Archaeor 2001
390	2	I	A				Na			Archaeor 2001
391	3	F	MA			L	Loose Flexed		O	Archaeor 2001
392	4	I	A				Na			Archaeor 2001

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
393	5	M	YMA		a comminuted stellate fracture on the right parietal and temporal with additional fracturing along lambdoid and occipitomastoid sutures, a single application of blunt force trauma to the mandible resulted in a perimortem comminuted fracture of the body of the mandible	V	Semi EXT		M	Archaeor 2001
394	6	I	A				Na			Archaeor 2001
395	7	M	MA			L	Tight Flexed		O	Archaeor 2001
396	8	PM	MA			L	Flexed	yes	O	Archaeor 2001

No	B	S	A	NDT	DT	DI	Position	Art	CA	EX
397	9	I	AO			L	Loose Flexed	yes	O	Archaeor 2001
398	10	F	MA	left ulna ante-mortem parry fracture, 5th lumber vertebrae compres-sion fracture due to spon-dylosis	4 ante-mortem depress-sion fractures on parietals, blunt force trauma	D	Loose Flexed	yes	O	Archaeor 2001
399	11	F	MA	left ulna ante-mortem parry fracture, well healed, compres-sion frac-tures 11th and 12th vertebrae due to spon-dylosis	peri-mortem linear fracture right temporal, blunt force trauma 2 ante-mortem depress-sion fractures on frontal, well healed	D	Loose Flexed		O	Archaeor 2001

APPENDIX B: CA-CCO-474/H Data

Table 24. Select data from CA-CCO-474/H, Hercules, California (Strother 2003, Estes et al 2002).

F= fetal (*In Utero),* I = Infant (Birth To Three Years), C= Child (Four To Twelve Years), AO= Adolescent (Thirteen To Seventeen Years), YA= Young Adult (Eighteen To Twenty Five Years), YMA = Young Middle Adult (Twenty Six To Thirty Five Years), MIA= Middle Adult (Thirty Six To Forty Five), MA= Mature Adult (Forty Six And Older), A= Adult (Over Twenty Five, All Epiphyses Fused)

F=Female, PF=Possible Female, I= Indeterminate , PM=Possible Male, M=Male

DISP = Disposition, V=Ventral, D=Dorsal, L=Lateral,

CA = Cultural Affiliation

Burial	Pattern	Disp.	Position	Age	Sex	Non- deliberate Trauma	Deliberate Trauma
1	Ohlone	L	Flex	MA	F	Healed rib fracture, antemortem, unidentified rib fragment, remodeling around lesion.	
2	Ohlone	L	Flex	I	IND		
3	Ohlone	L	Tight flex	MIA	M	Fracture of the right zygomatic, perimortem, no signs of healing.	
4	Ohlone	Ind	Flex	I	IND		
5		Ind	Ind	I	IND		
6		Ind	Ind	I	IND		

Burial	Pattern	Disp.	Position	Age	Sex	Non- deliberate Trauma	Deliberate Trauma
7		Ind	Ind	I	IND		
8	Ohlone	L	Tight flex	MIA	M		
9	Ohlone	D	Tight flex	MA	M		
10	Ohlone	L	Flex	I	IND		
11	Ohlone	D	Tight flex	YMA	M	Traumatic insult left side of hip, antemortem, osteophytic lipping around the margin of the auricular surface. The left ischial tuberosity is characterized by fine woven bone that covers most of the ischial surface.	
12.1	Ohlone	Ind	Flex	MA	M		
12.2	Ohlone	L	Flex	YMA	PM		
13		Ind	Ind	I	IND		
14	Ohlone	L	Tight flex	AO	PF	Enthesophyte development on right humerus at deltoid tubersity, possible traumatic injury or prolongued muscle activity	

Burial	Pattern	Disp.	Position	Age	Sex	Non- deliberate Trauma	Deliberate Trauma
15		Ind	Ind	I	IND		
16	Ohlone	Ind	Flex	I	IND		
17	Ohlone	V	Flex	YA	PF		
18		Ind	Ind	AO	IND		
19		Ind	Ind	A	M		
20	Ohlone	L	Flex	YMA	PM		
21	Ohlone	L	Tight flex	YA	F		
22.1	Ohlone	D	Loose flex	MIA	F		Perimortem, exhibited one application sharp force trauma to proximal left femur shaft. Obsidian biface embedded in unidentified lumbar vertebrae.
22.2	Ohlone	D	Loose flex	YA	F		Multiple perimortem cutmarks (22 shallow representing a minimum of 11 applications of sharp force trauma) on anterior and posterior portion of the left distal humerus near the articular joint, suggesting limb dismemberment. The lower left arm was not recovered. Cutmarks (a minimum of 16

Burial	Pattern	Disp.	Position	Age	Sex	Non- deliberate Trauma	Deliberate Trauma
							applications of sharp trauma) on superior and inferior surfaces of the right clavicle, indicating some type of incising trauma to the neck. A minimum of 27 applications of perimortem incising trauma represented by 32 cutmarks to the calvarium, strongly suggesting scalping.
22.3		Ind	Loose flex	YMA	PF		One application of sharp force trauma on the medial aspect of the zygomatic within the left orbit, no signs of healing.
23		Ind	Ind	I	IND		
24	Ohlone	Ind	Flex	I	IND		
25	Ohlone	Ind	Tight flex	I	IND		
26	Ohlone	L	Tight flex	I	IND		
27	Ohlone	Ind	Flex	I	IND		
28		Ind	Ind	I	IND		
29	Ohlone	L	Flex	YMA	M		
30	Ohlone	L	Flex	MIA	PF		

Burial	Pattern	Disp.	Position	Age	Sex	Non- deliberate Trauma	Deliberate Trauma
31	Ohlone	L	Flex	MA	M		Two shallow healed cranial depression fractures, antemortem, one on the left parietal and the second on the frontal
32	Ohlone	Ind	Flex	I	IND		
33		Ind	Ind	A	IND		
34	Ohlone	Ind	Flex	I	IND		
35	Ohlone	Ind	Flex	A	IND		
36	Ohlone	L	Flex	I	IND		
37		Ind	Ind	I	IND		
38		Ind	Ind	I	IND		
39	Ohlone	Ind	Flex	I	IND		
40	Ohlone	Ind	Flex	AO	IND		
41.1	Ohlone	L	Tight flex	YMA	F	Antemortem, healed compression fractures to 3rd 4th and 5th lumbar vertebrae	
41.2		Ind	Ind	INF	IND		
42	Ohlone	L	Flex	MA	F		Antemortem, left parietal evidence of blunt force trauma of two healed depression fractures
43		Ind	Ind	I	IND		
44	Ohlone	L	Flex	A	IND		
45.1	Ohlone	L	Flex	A	PM	Healed fracture to the left clavicular shaft, antemortem	

Burial	Pattern	Disp.	Position	Age	Sex	Non- deliberate Trauma	Deliberate Trauma
45.2		Ind	Ind	C	IND		
46	Ohlone	L	Tight flex	AO	M		
47	Ohlone	L	Tight flex	MIA	M		Outer table cranial vault showed 2 shallow depressions on the left parietal, healed cranial depression fractures, antemortem. 4 grooves representing 4 separate healed cutmarks on calvarium, antemortem.
48	Ohlone	D	Tight flex	MIA	M		
49	Ohlone	Ind	Flex	A	IND		
50		Ind	Ind	AO	IND		
51	Ohlone	Ind	Flex	A	IND		
52	Ohlone	D	Loose flex	MIA	M		The left superior portion of the frontal exhibits a healed depression fracture, antemortem
53	Ohlone	L	Flex	A	IND		
54		Ind	Ind	I	IND		
55		Ind	Ind	I	IND		
56		Ind	D	YMA	M		
57		Ind	Ind	I	IND		
58	Ohlone	V	Tight flex	AO	IND		

Burial	Pattern	Disp.	Position	Age	Sex	Non- deliberate Trauma	Deliberate Trauma
59	Ohlone	Ind	Loose flex	A	IND		
60		Ind	Ind	I	IND		
61	Ohlone	L	Loose flex	A	M		
62		Ind	Ind	I	IND		
63	Ohlone	L	Tight flex	MA	F		
64		Ind	Ind	I	IND		
65	Ohlone	L	Flex	MA	M		
66		Ind	Ind	I	IND		
67	Ohlone	D	Tight flex	MIA	M		
68.1	Ohlone	L	Flex	YMA	PM		
68.2		Ind	Ind	YA	PM		
69	Ohlone	L	Tight flex	C	IND		
70	Ohlone	L	Flex	AO	M		
71	Ohlone	L	Tight flex	YMA	F		
72	Ohlone	L	Flex	AO	IND		
73	Ohlone	L	Flex	C	IND		
74.1		Ind	Ind	YMA	M		
74.2		Ind	Ind	MIA	PF		
75	Ohlone	L	Flex	I	IND		
76	Ohlone	D	Loose flex	AO	PF		
77		Ind	Ind	A	PM		
78	Ohlone	Ind	Flex	A	IND		
79		Ind	Ind	I	IND		
80	Ohlone	L	Flex	YMA	M		
81		Ind	Ind	I	IND		
82	Ohlone	D	Tight	AO	IND		

Burial	Pattern	Disp.	Position	Age	Sex	Non- deliberate Trauma	Deliberate Trauma
			flex				
83	Ohlone	Ind	Flex	I	IND		
84	Ohlone	Ind	Flex	AO	IND		
85		Ind	Ind	I	IND		
86	Ohlone	Ind	Flex	A	IND		
87	Ohlone	L	Flex	I	IND		
88	Ohlone	L	Tight flex	AO	IND		
89	Ohlone	Ind	Flex	I	IND		
90	Ohlone	L	Flex	MIA	IND		
91	Ohlone	Ind	Flex	I	IND		
92	Ohlone	Ind	Loose flex	I	IND		
93	Ohlone	D	Loose flex	MIA	M	Left radius shows hypertrophic bone development along D portion of interosseous crest, likely the result of traumatic event and ossification of damaged muscle tissue. A corresponding bony development is visible on the left ulna inferior to the coronoid process. A slight curvature of the left ulna suggest a healed antemortem fracture.	
94		Ind	Ind	I	IND		
95		Ind	Ind	A	IND		
96	Ohlone	L	Flex	C	IND		

Burial	Pattern	Disp.	Position	Age	Sex	Non- deliberate Trauma	Deliberate Trauma
97	Ohlone	L	Flex	A	F		
98.1	Ohlone	Ind	Loose flex	A	F		
98.2	Ohlone	Ind	Loose flex	YMA	IND		
99	Ohlone	L	Flex	AO	IND		
100	Ohlone	L	Flex	YA	M		
101	Ohlone	L	Flex	C	IND		
102	Ohlone	L	Tight flex	YA	PF		
103	Ohlone	L	Flex	MIA	M		
104		Ind	Ind	I	IND		
105	Ohlone	L	Flex	I	IND		

APPENDIX C: CA-SCL-674 Data

Table 25. Select data from CA-SCL-674, the Rubino Site (Grady et al 2001, Pastron 1999)

F= fetal (*In Utero)*, I = Infant (Birth To Three Years), C= Child (Four To Twelve Years), AO= Adolescent (Thirteen To Seventeen Years), YA= Young Adult (Eighteen To Twenty Five Years), YMA = Young Middle Adult (Twenty Six To Thirty Five Years), MIA= Middle Adult (Thirty Six To Forty Five), MA= Mature Adult (Forty Six And Older), A= Adult (Over Twenty Five, All Epiphyses Fused)

F=Female, PF=Possible Female, I= Indeterminate , PM=Possible Male, M=Male

No = New number assignment, B=Burial, S=Sex, A= Age

DI = Disposition: V=Ventral, D=Dorsal, L=Lateral, O=Other (such as "Frog")

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
1		D	I	MA	F	Antemortem, healed fractures lower two left ribs	
2	Ohlone	L	Loose flex	MIA	F	Antemortem, healed right and left nasal fractures, healed possible parry fracture below olecranon process right ulna	Antemortem, healed parietal depression fracture
3		D	i	A	F	none	
4	Ohlone	L	flex	MIA	F	none	

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
5	Ohlone	L	Tight flex	MIA	IND	Antemortem, healed parry fracture left ulna, large callous and misaligned diaphysis	
6			i	MA	F	none	
7	Ohlone	D	flex	YA	M	none	
8			i	MA	M	none	
9	Ohlone	L	Tight flex	C	IND	greenstick fracture left fibula, possible trauma, bone is bowed anteriorly, no reactive bone observed, perimortem	
10			i	MA	M	none	
11	Meganos	D	Extended	MA	M	None	
12	Ohlone	L	Tight flex	MA	F	Antemortem, healed fracture fourth right metacarpal, shaft is bowed	
13		D	i	A	IND	none	
14			i	MIA	F	none	
15	Ohlone	D	Tight flex	MIA	M	Antemortem, healed right fibula fracture, non union transverse	
16		D	i	YMA	IND	none	
17			i	YA	IND	none	
18	Ohlone	L	Tight flex	MA	M	none	
19	Ohlone	L	flex	YMA	F	none	

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
20		L	i	YA	M	none	
21			i	INF	IND	none	
22			i	MA	F	none	
23	Ohlone	L	Tight flex	YMA	M	Perimortem, compression fracture 10th and 11th thoracic vertebrae	
24	Ohlone	L	flex	MA	M	none	
25	Ohlone	L	Tight flex	MA	F	Antemortem healed fracture right clavicle misalignment of the shaft occurred during healing	
26			i	C	IND	none	
27			not burial faunal				
28	Meganos	V	Extended?	AO	F		Perimortem, depressed cranial fracture right frontal, and associated stub fracture on endocranial surface
29			i	YA	IND	Antemortem, compression fracture on unidentified cervical vertebra	
30	Ohlone	L	flex	MIA	M	none	
31			i	MA	IND	Antemortem, healed left distal radius fracture, Colles	

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
32			i	AO	F	none	
33	Ohlone	D	Tight flex	YMA	F	none	
34	Ohlone	D	Tight flex	MA	M	Proximal unidentified left rib with antemortem, healed fracture, misalignment and thickening	
35			I	IND	IND	none	
36			not MNI				
37		V	I	YA	IND	none	
38			I	YA	IND	none	
39	Ohlone	L	Flex	INF	IND	none	
40	Ohlone	O	Tight Flex	MA	F	none	
41	Ohlone	L	Flex	MA	IND	none	
42	Ohlone	O	Loose Flex	YMA	F	none	
43	Ohlone	L	Loose Flex	MIA	M	none	
44		D	I	MA	F	Antemortem,compression fracture vertebrae, 11th and 12th thoracic and 1st lumbar vertebra	
45			Secondary - artifacts	YA	IND		right and left ulnae and radii artifacts - cutmarks, drilled, polish
46			i	AO	IND	none	
47	Ohlone	D	Tight flex	MIA	F	none	
48			i	IND	IND	none	

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
49	Ohlone	L	Loose flex	YMA	F	Antemortem, compression fracture 4th thoracic vertebra	
50			i	INF	IND	none	
51	Ohlone	D	Loose flex	MA	M	none	
52			i	C	IND	none	
53			not MNI				
54			i	C	IND	none	
55	Ohlone		flex	C	IND	none	
56	Ohlone	L	flex	MIA	F	none	
57			i	C	IND	none	
58			not MNI				
59			i	MA	F	none	
60	Ohlone	L	Flex	MA	F	none	
61	Ohlone	O	Tight flex	MA	F	Antemortem, healed parry fracture right ulna, tranverse with misalignment	
62	Ohlone	D	Loose flex	MA	M	Antemortem, 1st lumbar vertebra fracture of the inferior articulate process	
63			not MNI				
64	Ohlone	L	Tight flex	MIA	M	none	
65	Ohlone	L	flex	AO	F	none	
66			not MNI				
67	Ohlone	L	Loose flex	YMA	F	none	
68	Ohlone	L	flex	MIA	F	Antemortem, healed right and left nasal fractures	

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
69	Ohlone	D	Tight flex	MIA	F	Antemortem, right radius healed fracture, large callous, and right ulna healed parry fracture, large callous, callouses are adjacent to each other in anatomical position	
70		L	I	C	IND	none	
71		D	I	YMA	M	none	
72			not MNI				
73			not MNI				
74			not MNI				
75	Ohlone	L	Tight Flex	C	IND	none	
76	Meganos	V	Extended?	YMA	M		Perimortem, cutmarks left and right humerii, left 11th rib bisected by obsidian point
77			not MNI				
78			not MNI				
79			I	YA	IND	none	
80			I	C	IND	none	
81			I	C	IND	none	
82	Ohlone	O	Flex	MA	F	none	
83	Ohlone	L	Tight Flex	YA	F	none	
84	Ohlone	L	Tight Flex	MIA	F	none	
85	Ohlone	V	Tight Flex	YA	F	none	

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
86			I	MIA	F	none	
87	Ohlone	L	Tight Flex	MIA	F	none	
88			not MNI				
89	Ohlone	L	Loose Flex	YMA	M	Antemortem, healed 5th left metacarpal fracture, misaligned	
90			i	MIA	F	none	
91	Ohlone	D	Tight flex	YMA	M	none	
92			not burial faunal				
93			not burial faunal				
94	Ohlone	D	Loose flex	MA	F	none	
95			not MNI				
96			not MNI				
97			i	MIA	F	none	
98	Ohlone	D	Tight flex	MIA	M	none	
99	Ohlone	L	flex	MA	F	none	
100	Ohlone	O	Tight flex	MIA	F	none	
101	Ohlone	D	Loose flex	MA	F	none	
102	Ohlone	L	Tight flex	MA	F	Antemortem, healed greenstick right ulna, proximal one half of diaphysis laterally displaced	
103			I	MIA	F	none	
104			I	YMA	IND	none	
105			I	C	IND	none	
106	Ohlone	L	flex	AO	M	none	
107			I	YA	IND	none	

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
108	Ohlone	L	flex	MA	M	Antemortem, left radius greenstick fracture	Antemortem, healed right parietal depression fracture
109			not MNI				
110			not MNI				
111	Ohlone	D	Loose flex - other	MIA	M	Antemortem, healed left fibula fracture	
112	Ohlone	L	flex	C	IND	none	
113	Ohlone	D	Flex - other	C	IND	none	
114	Ohlone	L	flex	YMA	M	none	
115	Ohlone	L	flex	MA	F	none	
116	Ohlone	L	Tight flex	C	IND	none	
117	Meganos	V	Extended	YMA	F	Antemortem, healed transverse fracture distal right fibula	
118	Ohlone	L	flex	MA	F		Antemortem, healed cranial depression fracture left frontal
119	Ohlone	D	Tight flex - other	MIA	M	none	
120	Ohlone	D	Tight flex	MIA	F	none	
121	Ohlone	D	flex	YMA	F	none	
122			i	YA	IND	Antemortem, healed transverse fracture left distal ulna	
123	Ohlone	L	flex	C	IND	none	

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
124	Ohlone	L	flex	YA	M	Antemortem, healed fracture left clavicle at the midshaft	
125	Ohlone	D	flex	YMA	M	none	
126	Ohlone	V	Tight flex	YMA	F	none	
127			not MNI				
128	Ohlone	L	Tight flex	C	IND	none	
129	Ohlone	D	Loose flex	YMA	M	none	
130			not MNI				
131	Ohlone	D	Loose flex	YMA	M		Antemortem, healed shallow depression fracture right frontal
132			i	IND	IND	none	
133	Ohlone	L	flex	MA	M	Antemortem, compression fracture 2nd lumbar vertebra	
134	Ohlone	L	flex	YA	M		Perimortem, left illium puncture wound and cutmarks left and right distal humerii, chopmarks on left humerus
135	Ohlone	L	flex	MIA	F	none	
136	Ohlone	L	flex	MIA	F		Antemortem, healed depression fracture right parietal
137			i	YA	IND	none	

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
138	Ohlone	D	flex	MA	F	none	
139	Ohlone	L	Tight flex	MA	F	Antemortem, 2nd lumbar vertebra compression fracture	Antemortem, 2 healed depressed cranial fractures right parietal, shallow
140			i	YA	IND	none	
141	Ohlone	D	Tight flex	AO	IND	none	
142	Ohlone	L	flex	AO	IND	none	
143	Ohlone	L	flex	MA	F	none	
144	Ohlone	D	Flex - other	MIA	F	Antemortem, 3rd, 4th, 5th cervical vertebrae compression fractures	
145			not MNI				
146	Ohlone	D	Tight flex	YMA	M		Perimortem cutmarks right and left distal humerii, small piece of obsidian embedded within the anterior trochlear joint
147	Ohlone	V	Loose flex?	MIA	M	Antemortem compression fractures 5th 6th and 7th cervical vertebrae, healed fracture left fibula	
148			not MNI				
149			not MNI				

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
150	Ohlone	L	Loose flex	YA	F		Perimortem cutmarks and chopmarks on distal third left humerus
151	Ohlone	L	Loose flex	YMA	F	none	
152			not MNI				
153	Ohlone	L	Tight flex	MA	F	none	
154	Ohlone	L	Tight flex	YMA	IND	none	
155			i	C	IND	none	
156			i	YA	IND	Antemortem, compression fracture 2nd lumbar vertebra	
157			i	YA	IND	None	
158			i	YA	IND	None	
159	Ohlone	L	flex	MA	F	Antemortem, compression fractureof unidentified cervical vertebra	
160	Ohlone	L	flex	MIA	F	Antemortem compression fracture 6th cervical vertebra	
161			not MNI				
162			not MNI				
163	Ohlone	L	Loose flex	MA	F	Antemortem, healed fracture 5th metacarpal left, misaligned	
164			not MNI				
165	Ohlone	L	flex	MIA	M	Antemortem, healed compression fracture 3rd lumbar vertebra	Antemortem, healed depression cranial fracture on medial frontal

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
166	Ohlone	L	flex	C	IND		
167			not MNI				
168			not MNI				
169			i	MIA	F	Antemortem, healed fracture left radius, Colles	
170			i	C	IND	none	
171			i	INF	IND	none	
172			not MNI				
173	Ohlone	L	tight flex	MA	F	none	
174			i	YA	IND	none	
175			i	C	IND	none	
176	Ohlone	L	flex	INF	IND	none	
177	Ohlone	L	flex	MA	F	Antemortem, healed fracture proximal phalange	
178			i	A	M		A mandible with drilled human bone artifacts
179			i	AO	IND	none	
180			not MNI				
181			not MNI				
182	Ohlone	L	flex	MIA	F	Antemortem compression fracture 5th lumbar vertebra	
183	Ohlone	L	flex	C	IND	none	
184			i	YA	F	none	
185	Ohlone	D	flex	YMA	F	none	
186	Ohlone	D	flex	YMA	F	none	

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
187	Ohlone	D	flex	YMA	M	Antemortem compression fracture 10th thoracic vertebra	Perimortem cutmarks distal right and left humerii
188	Ohlone	L	Tight flex	MIA	F	none	
189	Ohlone	L	flex	MIA	F	none	
190	Ohlone	D	flex	MIA	F	Antemortem trauma induced lesions on 1st and 2nd lumbar vertebrae may be related to the spondylosis on the 4th lumbar	
191	Ohlone	V	Loose flex	YMA	M		Perimortem projectile wound resulting in comminuted fracture of left L occipital, hinged
192	Ohlone	L	flex	MA	M	Antemortem compression fracture 3rd and 4th lumbar vertebrae	
193			i	IND	IND	none	
194	Ohlone	L	flex	YMA	F	none	
195	Ohlone	D	Loose flex	YMA	M	none	
196			not MNI				
197			not MNI				
198			not MNI				

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
199	Ohlone	D	Tight flex	MA	M		Antemortem, healed cranial depression fracture right L occipital
200	Ohlone	L	Tight flex	MIA	M	Antemortem, healed fracture left horizontal ramus mandibular, healed non union fracture distal humerus right	
201			i	INF	IND	none	
202			i	C	IND	none	
203	Ohlone	L	flex	MIA	M	none	
204	Ohlone	L	flex	MA	M	none	
205	Ohlone	L	flex	MIA	M	none	
206		V	flex	YMA	M	none	
207	Ohlone	V	flex	MA	F		Perimortem cutmarks 1st cervical vertebra, may indicate projectile wound, perimortem traumatic lesion left humerus, oval shaped
208	Ohlone	V	Loose flex	YA	M		Perimortem comminuted fracture left parietal, cutmarks distal third right and left humerii

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
209			i	C	IND	none	
210			i	INF	IND	none	
211	Ohlone	V	flex	YA	F	Antemortem 5th lumber compression fracture	
212			not MNI				
213			not MNI				
214			not MNI				
215			not MNI				
216	Ohlone	D	flex	YA	M	none	
217			not MNI				
218	Ohlone	L	flex	MA	M	none	
219	Ohlone	L	Tight flex	MIA	M	none	
220	Ohlone	L	flex	C	IND	none	
221			not MNI				
222			not MNI				
223			not MNI				
224			i	YA	IND	none	
225	Ohlone	L	flex	A	F	none	
226			i	INF	IND	none	
227			not MNI				
228			i	MIA	F	none	
229			not iMNI				
230			i	A	IND	none	
231	Ohlone	L	Tight flex	MIA	F	none	
232			I	C	IND	none	
233			I	A	IND	None	

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
234	Ohlone	L	Tight Flex	YA	IND	Antemortem healed parry fracture left ulna, healed compression fracture right fibula	
235			I	YMA	M	none	
236	Ohlone	D	Tight flex	MIA	M	none	
237	Ohlone	V	Tight flex	MA	F	none	
238			i	MIA	F	none	
239			not MNI				
240			i	C	IND	none	
241	Ohlone	D	i	YA	M		Antemortem, healed depression cranial feature right parietal, perimortem chert projectile point embedded 9th thoracic vertebra, cutmarks left and right distal humerii
242	Ohlone	D	Loose flex	MIA	M	none	
243			i	A	M		Perimortem cutmarks distal right humerus
244	Ohlone	D	flex	MIA	M	none	
245			i	A	M	none	

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
246	Ohlone	L	Loose flex	MIA	M	Antemortem healed rib fracture, compression fracture left femur and tibia, right cuboid healed compression fracture	Perimortem cutmarks on left and right humerii
247	Ohlone	L	flex	C	IND	none	
248			not burial faunal				
249	Ohlone	L	flex	A	F	none	
250			i	I	IND	none	
251			i	YMA	IND	none	
252			not MNI				
253	Ohlone	L	flex	A	M	none	
254			i	C	IND	None	
255	Ohlone	D	flex	YMA	F		Perimortem trauma induced complete fracture frontal at glabella, perforates endocranial surface and sinus, possible projectile
256			i	IND	IND	none	
257	Ohlone	D	Tight flex	C	IND	none	

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
258	Ohlone	D	Tight flex	MA	F	Antemortem compression fracture 6th and 10th and 12th thoracic and 1st and 5th lumbar vertebrae, trauma induced lesion on the 9th, healed radius fracture, Smiths	
259			i	YA	F	None	
260	Ohlone	L	Tight flex	MA	F	none	
261	Ohlone	L	Tight flex	MA	F	Antemortem healed parry left ulna, fracture left radius misaligned, fracture right radius, healed non union parry right ulna	
262			i	C	IND	none	
263	Ohlone	V	flex	MIA	F	none	
264			i	C	IND	none	
265	Ohlone	L	Loose flex	YMA	M	Antemortem, healed nasal fractures both left and right	
266			i	A	IND	none	
267	Ohlone	L	Tight flex	MIA	F	Antemortem compression fractures on two unidentified thoracic vertebrae	
268	Ohlone	L	flex	YA	F	none	
269			i	C	IND	none	

Burial	Pattern	DI	Position	A	S	Non-deliberate Trauma	Deliberate Trauma
270	Ohlone	L	Tight flex	MA	F	none	
121A			i	INF	IND	none	
90A			i	INF	IND	none	

APPENDIX D: CA-ALA-343 Artifacts and Burial Associations

Table 26. Select data from CA-ALA-343, Fremont, California (Hylkema 2006, Marshall 2002, Thompson 2005).

Olivella bead types from Bennyhoff and Hughes 1987.

No = New number assignment, B=Burial, S=Sex, Artifacts = Artifacts Associated with Burial

DISP = Disposition, V=Ventral, D=Dorsal, L=Lateral, CA = Cultural Affiliation

No.	B	Artifacts	CA	Excavation	Other notes
1	1	Mica, Olivella Saddle		SJSU 1985	
2	2	Haliotis		SJSU 1985	
7	5	Obsidian Biface Blade		SJSU 1985	
9	7	Olivella A	Ohlone	SJSU 1985	
10	8	Haliotis, Mica, Olivella A And Ring, Obsidian Biface, Bone Tool, Scapula Saw Fragment		SJSU 1985	
12	10	Haliotis, Battered Cobble		SJSU 1985	
14	12	Haliotis, Olivella F3, Round Saddle Ring	Ohlone	SJSU 1985	
15	13	Mica, Spatulate, Obsidian Point Fragments, Chert Point Fragment, Olivella Small Saddle, Groundstone Fragments, Bone Tools	Meganos	SJSU 1985	
16	14	Mica, Obsidian Projectile Point, Olivella Square, Bone Tool	Meganos	SJSU 1985	
17	15	Mica, Spatulate, Olivella Saddle Small Square, Bone Tools, Obsidian Projectile Point Fragment	Meganos	SJSU 1985	
18	16	Haliotis	Ohlone	SJSU 1985	
19	17	Mica	Ohlone	SJSU 1985	
20	18	Haliotis Shield, Mica, Olivella Square Saddle Ring, Groundstone, Obsidian	Meganos	SJSU 1985	

No.	B	Artifacts	CA	Excavation	Other notes
22	19	Mica, Olivella F3 Square Saddle, Haliotis	Ohlone	SJSU 1985	
23	20	Olivella Saucer		SJSU 1985	
25	22	Bowl/Pipe, Spatulate, Haliotis	Meganos	SJSU 1985	
26	23	Fish Spears	Meganos	SJSU 1985	
27	24	Haliotis Shield, Spatulate, Bone Tool	Meganos	SJSU 1985	
28	25a	Bowl Fragment		SJSU 1985	
30	26	Mica, Olivella Saddle And Ring, Haliotis Shield	Meganos	SJSU 1985	
31	27	Mica, Spatulates, Olivella Small Square Saddles And Large Rings, Bone Tools	Meganos	SJSU 1985	
32	28	Mica, Spatulates, Haliotis, Olivella Square Saddles And Small Rings, Bone Tools, Charmstone Fragment	Meganos	SJSU 1985	
33	29	Olivella A And Ring	Ohlone	SJSU 1985	
34	30	Olivella A And Round	Ohlone	SJSU 1985	
36	32	Mica, Olivella Square Saddle	Ohlone	SJSU 1985	
39	34	Notched Phylite Lanceotes, Spatulate, Pestle Fragments, Groundstone	Ohlone	SJSU 1985	See Burial 39
43	38	Olivella Square Saddle, Bowl Fragment		SJSU 1985	
44	39	Spatulate, Olivella Ring, Bone Tool, Groundstone	Meganos	SJSU 1985	Also Numbered As Burial 33
46	41	Haliotis, Olivella A And G Round		SJSU 1985	
47	42	Mica, Olivella F3 Square Saddle And G, Haliotis, Bird Bone Whistles, Bone Tool Fragments	Meganos	SJSU 1985	
48	43	Olivella F3 Square And G, Haliotis, Mica	Ohlone	SJSU 1985	
55	46	Haliotis	Ohlone	SJSU 1985	

No.	B	Artifacts	CA	Excavation	Other notes
56	47	Spatulate, Bird Bone, Groundstone, Chert Biface	Ohlone	SJSU 1985	
57	48	Haliotis Shield, Bird Bone Tubes, Spatulate, Mica, Olivella Square And Ring, Atlatl Spur And Other Bone Tools	Meganos	SJSU 1985	
58	49	Mica, Bird Bone Whistle, Olivella A And Ring And Round, Haliotis	Meganos	SJSU 1985	
59	50	Haliotis Shield, Olivella F3 Saddles And G, Rounds And Rings		SJSU 1985	
60	51	Bird Bone Tube		SJSU 1985	
61	52	Bowl, Olivella Saddles And Rounds, Haliotis Shield, Bird Bone Whistle	Ohlone	SJSU 1985	
62	53	Mica, Olivella Saddles	Ohlone	SJSU 1985	
63	54	Olivella		SJSU 1985	
64	55	Bird Bone Whistle, Olivella A And Saddles And Rings, Haliotis Shield	Ohlone	SJSU 1985	
65	56	Olivella Round		SJSU 1985	
66	57	Haliotis, Olivella Saddles	Ohlone	SJSU 1985	
68	59	Bird Bone Whistle, Olivella A And Saddle And Round, Haliotis, Mica	Meganos	SJSU 1985	
71	62	Spatulate, Bone Tools	Ohlone	SJSU 1985	
76	67	Olivella A And Ring And Round		SJSU 1985	
78	69	Mica, Spatulate, Groundstone		SJSU 1985	
115	1	Bowl	Meganos	Archaeor 2000	
116	2	Pestle, Bone Tool	Ohlone	Archaeor 2000	
117	3	Olivella A And B And Sequin, Circular, Fish Vertebrae	Ohlone	Archaeor 2000	
119	5	Olivella Sequin, Mica, Haliotis		Archaeor 2000	
124	10	Charmstone Fragment, Groundstone, Small Bowl Fragment	Ohlone	Archaeor 2000	

No.	B	Artifacts	CA	Excavation	Other notes
127	13a	Olivella Oval, Haliotis		Archaeor 2000	
131	15	Obsidian Biface Fragment	Ohlone	Archaeor 2000	
132	16	Haliotis	Ohlone	Archaeor 2000	
134	18	Large Bowl, Pestle Fragments	Ohlone	Archaeor 2000	
141	25	Olivella Thin Rectangle Normal Sequin		Archaeor 2000	
142	26	Haliotis	Meganos	Archaeor 2000	
152	36	Haliotis	Ohlone	Archaeor 2000	
153	37	Haliotis, Olivella M	Meganos	Archaeor 2000	
155	39	Chert Projectile Point Tip	Ohlone	Archaeor 2000	
158	42	Haliotis	Ohlone	Archaeor 2000	
159	43	Olivella Normal Sequin Thin Rectangle, Haliotis	Ohlone	Archaeor 2000	44
162	46	Pestle Fragment	Ohlone	Archaeor 2000	
166	50	Handstone Fragment	Ohlone	Archaeor 2000	
167	51	Pestle Fragment		Archaeor 2000	
175	59	Bowl Fragment	Ohlone	Archaeor 2000	
176	60	Mica, Haliotis		Archaeor 2000	
178	62	Olivella Oval To Rectangle	Meganos	Archaeor 2000	
190	74	(100 +) Olivella Thin, Haliotis	Ohlone	Archaeor 2000	
197	81	Mica		Archaeor 2000	
199	83	Haliotis		Archaeor 2000	

No.	B	Artifacts	CA	Excavation	Other notes
200	84	Mica, Pestle	Meganos	Archaeor 2000	
201	85	Mica, Olivella M		Archaeor 2000	
203	87	Spatulate, Groundstone	Meganos	Archaeor 2000	89 90
204	88	Haliotis	Meganos	Archaeor 2000	96 97 98 99
205	89	Haliotis Shield, (300+) Olivella, 100+ Rectangle To Square, 30+ Round To, Spatulate, Mica, Obsidian Projectile Point	Meganos	Archaeor 2000	87 90
206	90	Spatulates With Olivella Applique, (200+) Olivella Rectangle To Square, Haliotis, Drilled Stone, Mica, Bone Pendant, Obsidian Biface Fragments	Meganos	Archaeor 2000	89 87
207	91	Bird Bone Tube	Ohlone	Archaeor 2000	
208	92	Bird Bone Tube	Ohlone	Archaeor 2000	
209	93	Stone Pendant	Ohlone	Archaeor 2000	
210	94	Olivella Rectangle To Square	Ohlone	Archaeor 2000	95
211	95	Olivella Thin Rectangle To Square Normal Sequin, Haliotis Shield	Meganos	Archaeor 2000	94
212	96	Olivella	Meganos	Archaeor 2000	88 97 98 99
213	97	(200+) Olivella Thin Rectangle To Square, Haliotis Shield	Meganos	Archaeor 2000	88 96 98 99
214	98	Spatulate, Human Tibia Pendant And Olivella Round To Square, Haliotis	Meganos	Archaeor 2000	88 96 97 99
215	99	Haliotis Shield, Olivella Square To Round	Meganos	Archaeor 2000	88 96 97 98
229	113	Haliotis	Ohlone	Archaeor 2000	
236	120	Perforated Stone	Meganos	Archaeor 2000	
239	123	Groundstone Fragments	Ohlone	Archaeor 2000	
241	125	Olivella A And F2	Ohlone	Archaeor 2000	

No.	B	Artifacts	CA	Excavation	Other notes
247	131	Obsidian Biface Fragment	Meganos	Archaeor 2000	139
251	135	Bone Tools	Ohlone	Archaeor 2000	
255	139	(20+) Olivella Round To Oval	Ohlone	Archaeor 2000	
258	142	Bowl Fragment	Ohlone	Archaeor 2000	
259	143	Charmstone	Ohlone	Archaeor 2000	
260	144	Pestle	Ohlone	Archaeor 2000	
264	148	Pestle And Groundstone Fragments	Ohlone	Archaeor 2000	
268	152	Haliotis	Ohlone	Archaeor 2000	
272	156	Olivella Rectangle To Square	Ohlone	Archaeor 2000	168
273	157	Olivella A, Haliotis	Ohlone	Archaeor 2000	
275	159	Olivella Rectangle To Square And Round To Oval, Mammal Whistle	Ohlone	Archaeor 2000	
276	160	Haliotis, (100+) Olivella Rectangle To Square And A	Meganos	Archaeor 2000	
278	162	Spatulate, Bird Bone Whistle, Haliotis	Meganos	Archaeor 2000	
284	168	Olivella Thin Rectangle To Square, Haliotis	Ohlone	Archaeor 2000	156
289	173	Obsidian Biface Fragment	Ohlone	Archaeor 2000	
291	175	Olivella Oval To Round, Oval To Square, G2 And F1	Ohlone	Archaeor 2000	
292	176	Obsidian	Meganos	Archaeor 2000	
301	185	Chert Biface Fragment, (60+) Olivella E And M	Meganos	Archaeor 2000	199
318	202	Haliotis, Olivella A	Ohlone	Archaeor 2000	
323	207	Olivella Thin Rectangles And Round	Meganos	Archaeor 2000	

No.	B	Artifacts	CA	Excavation	Other notes
324	208	Scapula Saw		Archaeor 2000	
325	209	Groundstone	Meganos	Archaeor 2000	187 188 189
337	220	Spatulate, (20+) Olivella Thin Rectangle To Square, Charmstone, Stone Pendant, Bone Pendant	Meganos	Archaeor 2000	
341	224	Haliotis, Olivella Thin Rectangle	Meganos	Archaeor 2000	225 226
344	227	Haliotis, Olivella M	Ohlone	Archaeor 2000	
346	229	Haliotis		Archaeor 2000	
347	230	Obsidian, (30+) Olivella Thin To Square And Round, Haliotis	Ohlone	Archaeor 2000	Large Obsidian Biface In Pelvic Cavity Did Not Impact
348	231	Haliotis, Olivella G And A	Ohlone	Archaeor 2000	232
349	232	Haliotis, Olivella G And A	Meganos	Archaeor 2000	231
350	233	Haliotis, Bird Bone, Olivella Thin Rectangle To Square	Ohlone	Archaeor 2000	Adult Mandible Above
351	234	Olivella M	Ohlone	Archaeor 2000	
355	238	Bone Tool	Ohlone	Archaeor 2000	
361	243	Spatulate	Ohlone	Archaeor 2000	
362	244	Haliotis, Olivella A And M	Ohlone	Archaeor 2000	
367	249	Large Bowl, Pestles, Bowl		Archaeor 2000	Remains Within Mortar, Associated with Another Mortar And

No.	B	Artifacts	CA	Excavation	Other notes
					Five Pestles
368	250	Pestles, Stone Pendant Fragment		Archaeor 2000	
370	252	Large Bowl, Groundstone		Archaeor 2000	In A Bowl Mortar
371	253	Haliotis	Ohlone	Archaeor 2000	Not Direct Association 247
373	255	Drilled Stone	Ohlone	Archaeor 2000	
376	258	Bowl Fragment, Pestle	Ohlone	Archaeor 2000	
382	264	Bird Bone Whistle	Ohlone	Archaeor 2000	
384	266	Olivella Thin Rectangle And Oval, Haliotis	Meganos	Archaeor 2000	267
385	267	Olivella Thin Rectangle And Oval	Meganos	Archaeor 2000	266
387	269	Olivella Thin Rectangle And A	Ohlone	Archaeor 2000	
396	8	Large Bowl On Thorax	Ohlone	Archaeor 2001	
397	9	Haliotis, Spatulate	Ohlone	Archaeor 2001	
398	10	Bowl Fragment	Ohlone	Archaeor 2001	10