

Raising the Dead: Mortuary Patterns in Pacific Nicaragua

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Mortuary practices are fundamental expressions of religious ideology and cultural identity. Unfortunately, in Pacific Nicaragua cemeteries are also the principal targets of illegal looting, so relatively few scientific excavations have been conducted. This paper will summarize research on mortuary practices from the recently excavated sites of Santa Isabel, Tepetate and El Rayo, all dating to the Sapoa period (800-1250 CE). While there are some overarching similarities that link the sites, especially through the importance of large, shoe-shaped burial urns, there are also significant differences in mortuary practices. There is also variation among sites in the age, sex and health profiles of interred individuals, which is explored in relation to differences in site function as well as regional mortuary diversity. Finally, these sites provide data for one of the first bioarchaeological analyses of human remains for Pacific Nicaragua, which is hoped to initiate the formation of a regional database.

As with most aspects of Nicaraguan prehistory, the relative lack of scientific investigation has impeded detailed interpretation. Mortuary studies are somewhat of an exception to this norm, as several archaeologists have encountered burials and some of these have been published (**Figure 1: Map of Nicaragua**). The most extensive cemetery was excavated on Ometepe Island, with burials spanning a long time range (Haberland 1992). The Las Placeres cemetery from near the shore of Lake Managua was excavated by Lange as part of his urban survey (Garcia;). Burials were also recovered from a rescue excavation at Malacatoya (Espinoza et al. 1999). Recently, a Late Tempisque period cemetery, also from Managua, has been partially excavated (Moroney ; Pavon ; Platz). Based on these and other unpublished discoveries a rough outline of changing mortuary patterns has been established (Garcia). In part due to the poor preservation of osteological remains, however, a detailed bioarchaeological profile of prehispanic populations has not been developed.

Recent excavations by archaeologists from the University of Calgary have specifically explored domestic contexts from the Sapoa period, with the research goal of evaluating cultural identities relating to possible migrants to Pacific Nicaragua (McCafferty 2008, 2010). In the process of these investigations numerous burial contexts have been encountered, ranging from isolated urn burials to more dedicated cemetery areas, and possibly a ritual burial ground. This paper will summarize the different burial contexts and contrast mortuary practices from the distinct sites. It will then present detailed osteological data from Santa Isabel and El Rayo.

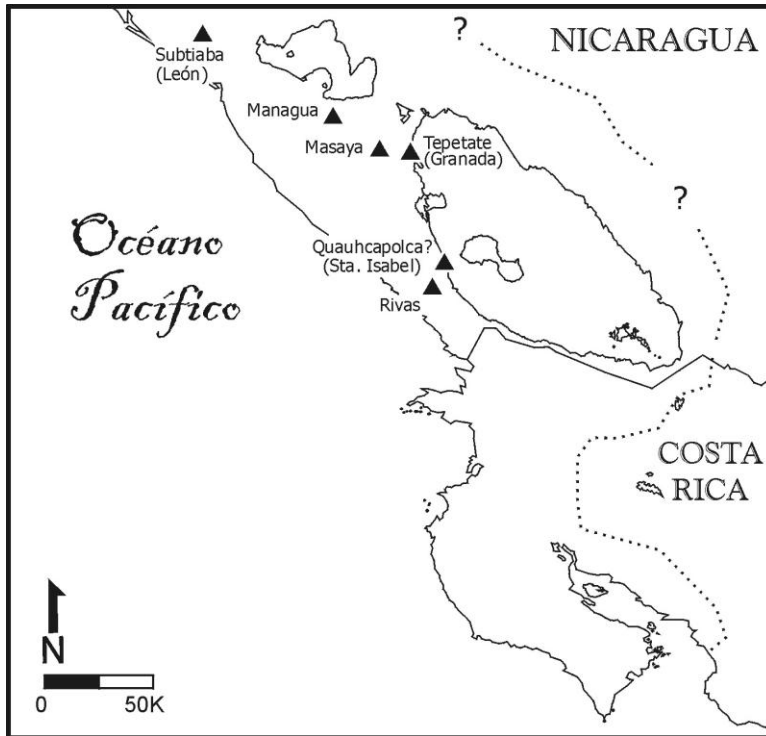


Figura 1: Mapa de Gran Nicoya.

Santa Isabel

Santa Isabel is located on the shore of Lake Nicaragua, in the Department of Rivas (**Figure 2: Map of Santa Isabel**). Previous excavations had established it as an important Postclassic site (Healy 1980), and the regional survey by Karen Niemel (2003) demonstrated that it was the paramount center of a multi-tier settlement hierarchy. Between 2000 and 2005, excavations sampled the site center, including five of the estimated forty low mounds (McCafferty 2008). These consisted of accumulations of domestic debris, including the architectural collapse of wattle-and-daub structures. Seventeen radiocarbon dates established the occupation history for this portion of the site as between 900 to 1250 CE (McCafferty and Steinbrenner 2005; McCafferty 2008). Interspersed on mounds were both burial urns and primary interments; a cluster of burial urns was also discovered north of Mound 5 in an area where shovel testing had indicated very low artifact density.

Two distinct mortuary patterns were discovered. One adult male and a sub-adult were buried in primary context, directly in the soil, in extended position with their heads to the east (**Figure 3: Adult and child burial**); a second sub-adult was also found as a primary interment on Mound 6. The adult and child were likely buried together, based on proximity and parallel orientation; a burial urn with remains of a 6 month old infant was also found near the adult. An unusual miniature urn, decorated with molded faces perhaps representing owls, was found with the adult, as were several bone tools and a finely made chert drill. The sub-adult lacked grave offerings, but was buried with its head resting on a turtle shell.

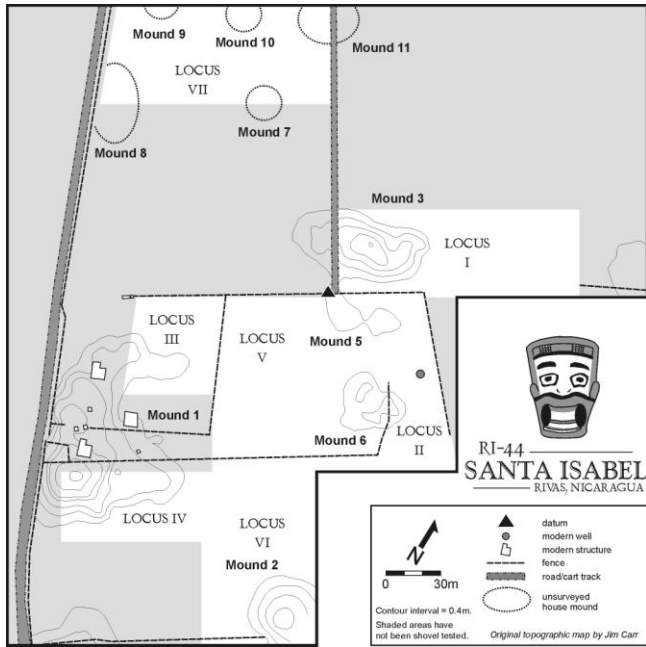


Figure 2: Plan of Santa Isabel excavations



Figure 3: Adult and sub-adult burial; vessel found with adult

The majority of the burials were found in shoe-shaped urns of the Sacasa Striated type. These are asymmetrical vessels, with a large orifice at one end (**Figure 4: Sacasa shoe pot**). The opposite end is often decorated with appliqué designs that have been compared to female internal anatomy, prompting art historian Laura Wingfield to term them ‘womb pots.’ The urns typically have an inverted bowl covering the orifice. These burial urns were found either as

isolated vessels or in clusters. For example, a group of four urns was found west of Mound 5 in an area with very light artifact density (**Figure 5: Cluster of burial urns**). These urns consistently contained infant remains, and sometimes several individuals were present in a single vessel. Probably because the ceramic vessel retained moisture, skeletal remains were typically poorly preserved, and often teeth were the only evidence found. No obvious grave goods were associated with these burials, although a stingray spine was found in the fill of one urn.



Figure 4: Sacasa shoe-pot



Figure 5: Cluster of shoe-pots near Mound 5

Based on the demographic pattern of only one adult as opposed to five children and even more infants (no MNI was possible due to fragmentary remains), and informed by the high percentage of adults in the Los Angeles cemetery excavated by Haberland (1992) on Ometepe Island, it was predicted that other unidentified burial areas probably exist away from the site core

(McCafferty 2008). The high frequency of infants interred in burial urns, in and around the residential mounds, is consistent with ethnographic and ethnohistorical accounts of infants who died before weaning as being able to be ‘reborn,’ much like a seedling that can grow again if replanted. With this in mind, the use of ‘womb pots’ decorated with female imagery as a means of ‘re-planting’ a fetus is plausible.

Tepetate

In 2008, investigations shifted north to the site of Tepetate, located on the northern edge of the modern and Colonial city of Granada. Tepetate has long been known archaeologically, though relatively little of the research has been published (Carmack and Salgado 2006). The site represents the Contact period community of Xalteva, a regional center for the Chorotega ethnic group and the name is still associated with the indigenous barrio of Granada. Although Tepetate has been severely looted in recent decades, as well as having been largely covered over by the urban growth of Granada, it was selected for archaeological testing since it was apparently occupied at Contact (Salgado 1996).

Excavations were conducted at three loci: Mound 1 is one of the last remaining mounds at the site, while Loci 2 and 3 were identified during the initial shovel test survey. Locus 3 is of particular interest for this discussion due to the discovery of two group burials. Two radiocarbon dates from Tepetate range between 1000 to 1200 CE, so again are consistent with the Sapoa period and are contemporary with the occupation of Santa Isabel.

Mound 1 was badly disturbed by recent looting, with the surface covered with mixed architectural rubble and several looters pits filled with modern materials, including skeletal remains of domesticated animals (**Figure 6: Mound 1**). Reaching a depth of about 1 meter, however, intact remains of stone floors were discovered. While almost no human skeletal remains were recovered, a stone-lined vault probably represents a looted tomb (**Figure 7: Stone lined vault**); a single human tooth was found in the area. Tombs outlined with vertical stone slabs are known from cemeteries in Costa Rica, and one was recently excavated at the La Chureca site in Managua (Jorge Zambrana, personal communication, 2010); several stone outlines are also visible on the surface at El Rayo but have not yet been excavated.

The most extensive burial information from Tepetate was encountered at Locus 3, located about 200 m west of Mound 1. Unfortunately, these group burials were discovered at the end of the planned field season, so actual excavation occurred after most of the team had left the field, and recovery was further hampered by heavy rains. Two clusters of burial urns, including both shoe-shaped urns and large ollas, were found with poorly preserved human remains both within and over the top of the vessels (**Figure 8: Burial clusters**). The urns themselves were crushed, perhaps due to their proximity to the surface, but were also nested one within another on top of others, as if they had been stacked and then crushed. Associated diagnostic pottery supports the and temporal affiliation with the Sapoa period occupation. At least some of the skeletal remains pertain to adult individuals (**Figure 9: Skeletal remains**), but due to the extremely fragmentary nature of the bones they could not be removed for analysis.



Figure 6: Mound 1 excavations



Figure 7: Possible looted burial crypt in Mound 1



Figure 8: Burial clusters from Tepetate, Locus 3

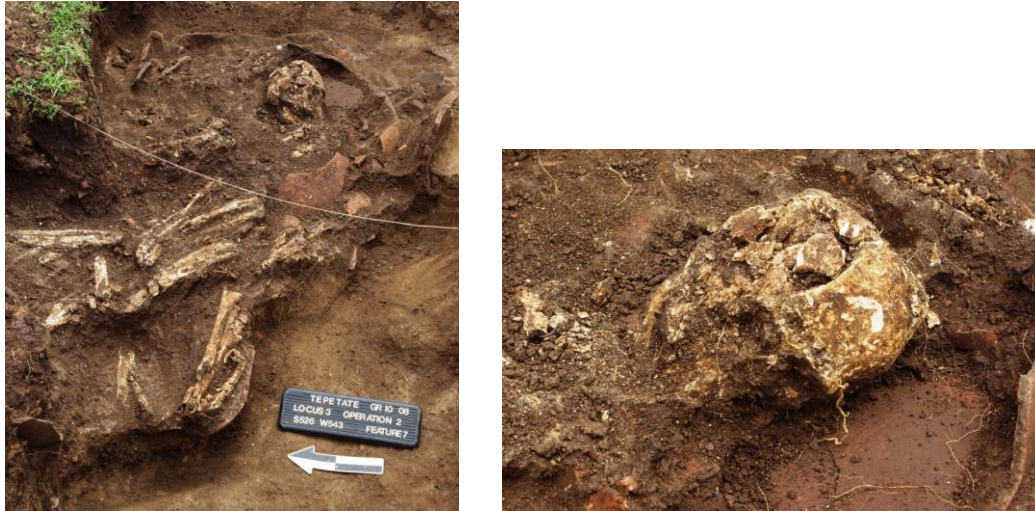


Figure 9: Primary adult burial associated with urn cluster

In addition to the burial vessels themselves, some associated objects were likely included as offerings (**Figure 10: Grave goods**): a greenstone bead, an elaborate ceramic earspool, bowls, and miniature vessels were recovered.



Figure 10: Earspool and miniature vessel from burial cluster

While the remains found at Tepetate were not useful for osteological interpretation, the burial contexts do expand the corpus of Sapoa mortuary practices. The empty stone-lined crypt within what was probably a high status residential mound represents the most elaborate mortuary context – in terms of labor investment – yet discovered in Pacific Nicaragua. The clusters of burial urns from Locus 3 are somewhat similar to one of the clusters from Santa Isabel, with the exception of the nested and crushed nature of the urns. It is also distinctive because in contrast to the exclusively infant burial population in urns from Santa Isabel, at Tepetate the clusters were associated with adult individuals, at least among the identifiable remains.

El Rayo

In 2009, the research focus again shifted, moving to a second-tier site from within the Tepetate polity. El Rayo was discovered during Silvia Salgado's (1996) settlement survey of the Granada region. It is located at the tip of the Asepe peninsula south of Granada; the peninsula was formed by the collapse of part of the Mombacho volcano, and in about 500 CE a volcanic lahar covered the peninsula with a layer of ashy sediment (Shea et al. ?). Recent road construction exposed remains of a prehispanic cemetery, with burial urns and human remains in the road cut immediately above the lahar deposit (**Figure 11: Cemetery deposit in road cut**). This area was designated Locus 1 and became the subject of intensive excavations. Shovel testing to the north and west of the cemetery discovered other artifact concentrations that became the focus of two additional excavation areas. Locus 2 featured domestic remains relating to both Late Bagaces (500-800 CE) and Sapoa period occupations. Locus 3 was located about 200 m to the west, with additional mortuary remains found on the slope of a low hill. Returning to El Rayo in 2010 allowed additional testing at Locus 2 to clarify architectural features associated with the domestic remains, and also to survey an adjoining area to Locus 3 where several mounds had been cleared for planting.



Figure 11: Locus 1 exposed in road cut

El Rayo is significant because it is currently the most extensively explored multi-component site in Pacific Nicaragua. Furthermore, because the occupation spans the time period of the alleged migration of Mesoamerican groups it provides an excellent basis for evaluating associated cultural changes (McCafferty et al. 2009). Seven radiocarbon dates indicate an occupation beginning about 600 CE and continuing until about 1250 CE; three dates bracket dramatic changes in ceramic style at about 800 CE, probably representing the arrival of the Chorotega group.

In addition to changes in ceramic style, mortuary practices also distinguish the Sapoa from Bagaces occupations. In both Loci 1 and 2, Bagaces period burials were primary interments in either flexed or extended position. Fragmentary skeletal remains including long bones and a poorly preserved skull were found at Locus 1 immediately above the lahar ash (**Figure 12: Primary burials from Locus 1**). Associated with these bones were a complete

basalt mano and a spindle whorl; nearby were three complete vessels. One of these vessels was a bottle filled with silt, and another was a small tecomate modeled in the form of a naked female, and filled with pebbles (**Figure 13: Vessels associated with Feature 35**). The third vessel was a small olla with the modeled face of a small mammal, possibly an opossum; inside were fragmented cranial remains of an adult male (?), including nine teeth, and also an infant as represented by cranial fragments and three deciduous teeth.



Figure 12: Primary interments from Bagaces period, including long bone with mano

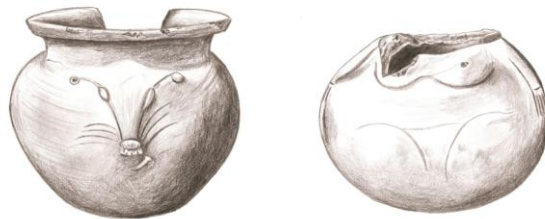


Figure: Feature 35 vessels (Drawings by Armando Torres)

At Locus 2, three burials were found relating to the Bagaces occupation levels. One was a fetus found among domestic refuse; notable was faint evidence of cut marks on the diaphysis. Individual 16 was an adult buried in an extended position with the head to the southwest (242°); no artifacts were found in association other than Bagaces ceramic fragments in fill. Individual 25 (44-1) was the most complete skeleton recovered at El Rayo (**Figure 14: Individual 25/44-1**). It was an Old Adult buried in a flexed position on its right side with the head to the north, and placed on a compact surface. No grave goods were found associated with this burial.



Figure 14: Individual 25/44-1

Sapoa period burials were found at Loci 1 and 3; a single Sacasa Striated shoe-pot was found at Locus 2 (Feature 27) but no skeletal remains were recovered. Burial urns were found throughout Locus 1, although due to road construction the remaining area was highly constricted (measuring about 5 x 20 m) between the road and a rocky hill made up of basalt boulders. Artifacts were visible on the opposite side of the road, including some complete vessel rims suggesting additional burial urns, but no testing was conducted. It could not be conclusively determined if the Sapoa period burials represented continuous use of the Bagaces cemetery, or whether it reflected a form of ‘social memory’ of the area. The mortuary patterns are quite distinctive, as an important indication of cultural changes between the two time periods. One possible transitional burial may provide a link between the two periods: Feature 16 was slightly deeper than the nearby Sapoa burials, and included an unusual yellowish superhemispherical bowl with striations on the exterior surface, similar to Sacasa Striated (**Figure 15: Feature 16 burial urn**). Nearby, and probably related, were three small vessels, including two miniature shoe-pots.

Burial urns consisted of both Sacasa Striated shoe-pots and large ollas. Probably due to the poor preservation conditions, few complete bones were recovered and most were highly deteriorated. Many bone fragments indicated burning, consistent with cremation in an open fire. Curiously, several isolated skulls were located outside of the urns as possible evidence of



Figure 15: Transitional burial pot from Feature 16, with associated small shoe-pots

decapitation for trophy heads. In support of this interpretation were several well-made chert biface blades, similar in size and shape to knives depicted in decapitation ceremonies at Meosamerican sites such as El Tajin and Chichen Itza (**Figure 16: Biface knife compared to image from El Tajin**). One of these blades was found inside the mouth of a skull interred inside of an urn (Individual 3-2; **Figure 17: Knife associated with Individual 3-2**). Whereas the skeletal remains associated with this vessel were originally designated as Individual 2, osteological analysis later identified remains of three individuals: a young adult, a middle age adult, and an infant – Individual 3-2 was the middle age adult.

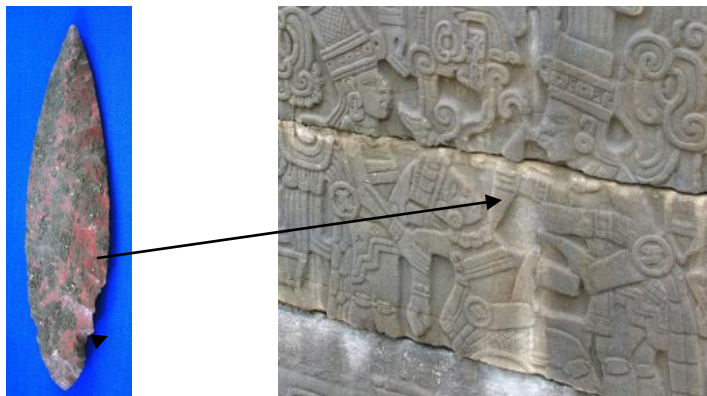


Figure 16: Biface knife from Locus 1, compared to knife used in El Tajin decapitation scene

If skeletal remains were relatively rare in the urns, other elements were more common. For example, urns often contained one or more small vessels inside. Feature 6 was a Sacasa shoe-pot covered with an inverted Castillo Engraved bowl; inside was a complete Pataky Polychrome vase (**Figure 18: Shoe-pot with Castillo cover and periform vase**). Feature 20 was a shoe-pot placed adjacent to Feature 13; it contained three vessels: a small shoe-pot, a polychrome bowl, and a small olla with modeled face (**Figure 19: Bowls inside Feature 20**).



Figure 17: Feature 3 skull in ceramic vessel with knife in mouth



Figure 18: Feature 6 shoe-pot with broken lid, and Pataky vase from inside



Figure 19: Features 13 and 20, with small vessels inside F20

Features 29 and 30 were also shoe-pots placed adjacent to one another with cranial fragments within the urns but long bones outside of the vessels. Two complete vessels were found within F. 29: a polychrome superhemispherical bowl and a small polychrome tripod bowl (**Figure 20: Vessels within F 29**).



Figure 20: Features 29 and 30, with small vessels within F29

Cobbles of volcanic rock were another common element inside of the urns – some vessels contained more than 50 rocks ranging in size up to about 20 cm in diameter. This was far higher than the stone concentration outside of the urns, clear indication that the rocks were intentionally placed within the vessels. Other rocks seem to have been wedged beside urns as a form of bracing; some alternated rocks and large sherds as bracing materials. Urns seem to have been placed on prepared, packed surfaces with pebble or sherd paving. Hard packed surfaces with broken pottery were also observed above burial urns. Another unusual element of the urns was that they often included large fragments of broken pottery placed around the interior base, as if bolstering the vessels. This idea was even more dramatically displayed in Feature 31, where several vessels appear to have been nested one within another (**Figure 21: Nested urns from F31**).



Figure 21: Nested urns from Feature 31

Other than small vessels within the urns, and an abundance of rocks, objects were relatively rare. Feature 34 included three urns in a cluster, as well as a small Papagayo bowl that contained numerous small beads; other beads were scattered around the feature (**Figure 22: Feature 34 with urns and small bowl with beads**). Nearby was a well-made lance point, as well as a cluster of three finely flaked biface knives made of red chert, and two large ceramics earspools that measured about 5 cm in diameter (**Figure 23: Feature 19 with biface points and large earspools**). Earspools typically measured about 2 cm in diameter, and these are by far the largest we have encountered in Nicaragua.



Figure 22: Feature 34 with urns and small bowl, and beads from feature



Figure 23: Feature 19 with cache of blades and ear spools, next to human skull; detail of ear spools

A possible grave offering found in association with Feature 5 contained numerous net weights, possibly representing a fishing net draped over the urn (**Figure 24: Feature 5 with assorted net weights**). The weights were found commingled with scattered skeletal remains relating to a young adult and a child. Since the El Rayo site is located at the tip of the Asese

peninsula, surrounded by water, and because fish bones were the predominant faunal remain found, it is reasonable that net fishing was likely an important occupation of the residents.



Figure 24: Feature 5 urn with assorted net weights

Otherwise, burial goods were rare and dispersed (**Figure 25: Assorted isolated grave goods**). A ceramic pendant was found near Features 13 and 20, and an ornate ceramic earspool vessel was found nearby. Feature 23 was found eroding out of the road cut with several urns and small vessels; also associated was a complete figurine of a hunchback, a fairly common form in Pacific Nicaragua. Several ground stone tools – manos, metate fragments, and a pestle – were found in mortuary contexts, including a mano that had been absorbed into a tree root associated with Features 29 and 30.



Figure 25: Assorted objects from Locus 1 mortuary contexts

The Sapoa period Locus 1 burials appear to be densely distributed throughout the small area tested: each of the four operations encountered multiple urns with commingled human remains both within and outside of the vessels. The poor preservation of skeletal remains may be explained by evidence of cremation, the shallowness of the deposits beneath ground surface,

as well as extreme root disturbance. While all ages were represented in the burial population, there was a majority of adult individuals; this is skewed, however, since the possible trophy heads were included in the sample.

Locus 3 was identified by artifact concentrations and a possible walking surface during initial shovel testing, and additional STPs up the slope of a low hill encountered skeletal remains and complete vessels. Two operations were excavated to investigate these features, resulting in the recovery of the most elaborate mortuary practices and grave goods from El Rayo.

Features 32 and 40 were both located in shallow deposits in a 2 x 2 m area (N523-524 E300-301), and may relate to a common depositional event. Remains of at least four individuals were recovered, though root disturbance and animals dispersed skeletal remains over a broad area (**Figure 26: Feature 40 burial remains**), and resulted in poor preservation of the bones. Some of the bones exhibited evidence of gnawing, and others were burnt. Osteological analysis of Feature 32 identified the remains of at least two individuals: an infant (based exclusively on teeth), and 15-18 year old sub-adult based on both cranial and post-cranial remains. Feature 40 also included two distinct individuals: a young (3.5 years) sub-adult represented only by teeth, and a young adult (18-30 years) represented by cranial and post-cranial remains. A complete bowl was recovered from the initial shovel test, and further excavation discovered a complete Papagayo Polychrome periform vase, a small bowl covered by an inverted vessel, a copper bell, ceramic ocarina, jaguar tooth pendant, and two bone weaving tools (**Figure 27: Grave goods from Features 32 and 40**).



Figure 26: Individual 28 from Feature 40, with associated cranium and Papagayo vase

By far the most complex feature encountered was Feature 33, located ten meters north of the previous burials, and further upslope. The initial shovel test encountered a shoe-pot urn just below the surface, and the area was opened up to eventually encompass 10 square meters of clustered urns and a stone foundation (**Figure 28: Plan view of Feature 33; Figure 29: Burial urns from Feature 33**). Twelve urns were placed in a north/south alignment, located immediately west of a small foundation of two, 2 m long walls of large stones placed about 1 meter apart, and joined by perpendicular walls at either end and another in the middle. The



Figure 27: Grave goods associated with Features 32/40

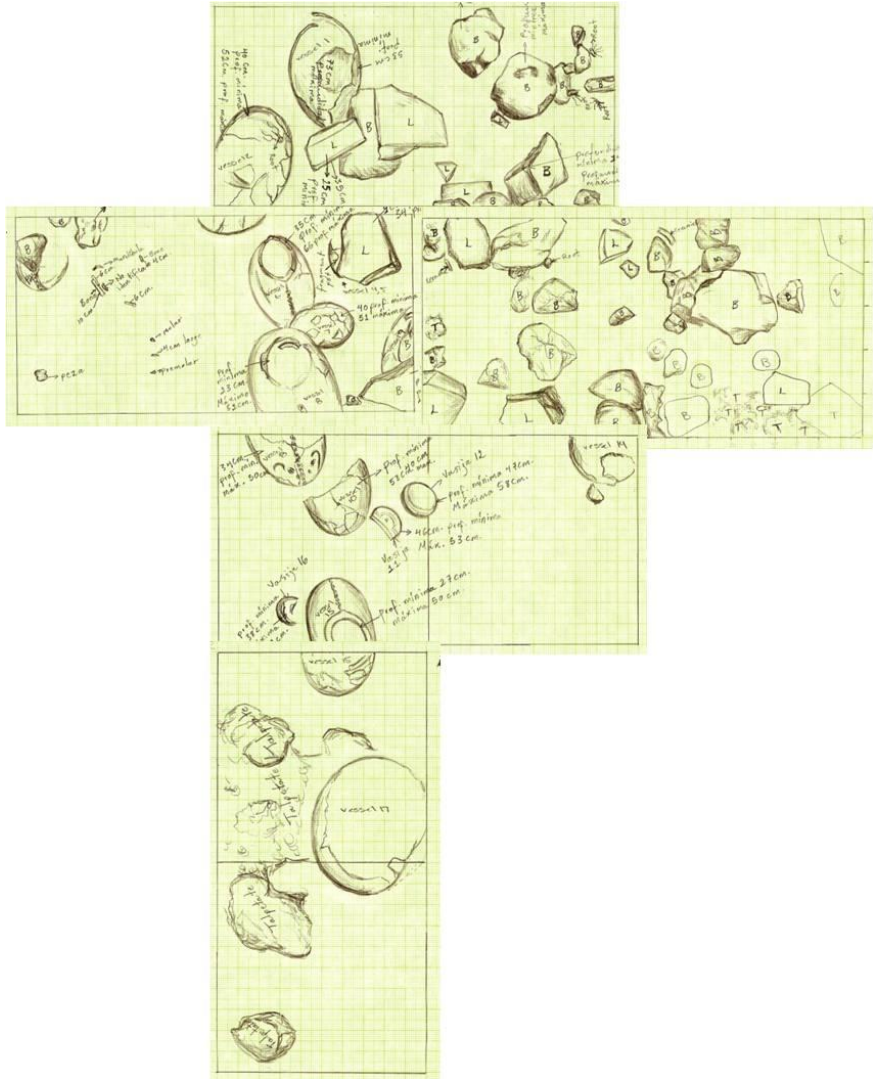


Figure 28: Plan view of Feature 33



Figure 29: Feature 33 urn cluster

feature was just below ground surface, and some of the urns were placed directly on or into bedrock. Due to time constraints only four of the urns were excavated *in situ*, and few bones were found within the urns; the exception was Vessel 17 which contained cranial and post-cranial remains of an adult. Scattered around the outside of the vessels, however, were the remains of at least four additional individuals: an infant, a sub-adult of about 8 years, a young adult (18-25 years), and a middle age adult. Only teeth of the sub-adults were present, with all other bones relating to the adults. Remains of one adult were consistently burnt, suggesting cremation and special mortuary treatment. The individual originally identified as #21 was found distributed around the urns over a wide area of the feature, and mends/joins and articulation indicate commingling of what must have been secondary remains.

In addition to the burial urns themselves, five smaller vessels were encountered (**Figure 30: Small bowl and basalt stool associated with Feature 33**), including two Vallejo bowls and a miniature shoe-pot. Other than the urns and small vessels, few grave goods were found. Within one of the excavated urns was a large fragment of a 3-legged basalt stool, and in another urn was a bifacially flaked chert knife.



Figure 30: Vallejo bowl and basalt stool from Feature 33

In contrast to the more communal cemetery encountered at Locus 1, Locus 3 may have had a more restricted function. Feature 33 in particular seems to have been a burial cluster associated with a small structure, possibly a shrine. Similar shrines are described by Oviedo in reference to Nicarao ritual practice, but none have previously been discovered archaeologically. The dispersal of secondary remains around the urn cluster is somewhat similar to the clusters found at Tepetate. The north/south orientation of the aligned urns may also relate to a general pattern of north/south orientations found for primary burials at Loci 1 and 2. The offerings found with Feature 32/40 are among the most exotic, and presumably valuable, found at the site, including the copper bell, jaguar tooth pendant, and complete ocarina. Although speculative, this relates to a high status burial located near the burial shrine.

BIOARCHAEOLOGICAL ANALYSIS

Poor preservation is one of the biggest impediments in the study of human remains from the Greater Nicoya region. Wet ground conditions combined with intrusive plants and rodent activity severely affect the bones, thus limiting in depth bioarchaeological analyses. This is especially true for remains found within urn burials, and few complete bones are recovered because of the urns retain moisture and thereby the bones deteriorate rapidly. Fortunately, teeth are always one of the best preserved parts of the body, even in wet conditions, therefore, the Ubelaker dental development chart (Buikstra and Ubelaker 1994) was used in conjunction with the Moorrees, Fanning and Hunt code (1963a; 1963b) to ascertain age estimates for all of the juvenile remains. Adult remains were aged and sexed, when possible, following a variety of the guidelines in *Standards for Data Collection from Human Skeletal Remains* (Buikstra and Ubelaker 1994) that depended on what parts of the skeleton were available for analysis. The majority of adult remains were given a fairly general age designation as well as an undetermined or probable sex.

Santa Isabel:

Age and Sex:

At Mound 5 an older adult definite male (40+) was found in an extended position with a child, of 4-5 years, on its right side. A burial urn was also found associated with these two primary interments, close to the adult's right hip and at the same depth, which contained the

remains of a 6 month old child. Another primary flexed burial was found in Mound 6 of a child between 3-5 years. Eight of the nine urn burials excavated between the 2003-2005 seasons contained human remains which had an age range of birth to 3 years (**Figure 31: Infant skeleton in burial urn**), except for the second urn of the 2004 season which contained at least 3 individuals with age ranges from 3-9 years. A total MNI for the remains from the burial urns of Santa Isabel was not possible to calculate due to the poor preservation and potential commingling of remains within them.



Figure 31: Infant skeleton in burial urn

Dentition:

The dental record at Santa Isabel provides strong evidence for a coarse diet of starchy-carbohydrates. Incisors, canines and premolars were systematically scored for wear according to Smith (1984) and molars according to Scott (1979). The teeth are moderately reduced and evenly worn across the dentition in the adult as well as many of the children. Moderate to severe sub- and supra-gingival dental calculus (i.e. mineralized plaque) were found on adult teeth, however no caries were recorded on any of the teeth.

Additionally, the trait of shoveling was recorded in the Santa Isabel sample. *Shoveling* is a trait that affects the marginal ridges on the lingual surfaces of incisors and occasionally canines, producing a “shovel-shaped” tooth (Hillson 1996; Scott and Turner 1997). There were 10 central and 10 lateral upper incisors that were scored for shoveling and since it remains unclear whether shoveling is a bilateral trait, both left and right upper incisors were recorded, as were deciduous and permanent. There was 100% frequency in maxillary central and lateral incisors. They range from faint to severe, however, many of the teeth scored have moderate to heavy attrition which made it difficult to record a complete score.

Pathology:

Linear enamel hypoplasias (LEH) are large horizontal furrow defects in the enamel of the crown of a tooth caused by episodic disruptions in the growing dentition (Hillson 1996:165). These disruptions can be caused by illness or nutritional deficiency, and can be used in conjunction with an individual's dental development chronology to form an idea of when in the

individual's life these disruptions took place. It was noted in the remains from Santa Isabel that LEH were identified on a number of teeth, but time limitations prevented any further recording or analysis.

Porotic hyperostosis is another pathological stress marker that has been linked to anemia/nutritional deficiency. Only one example of this was recorded at Santa Isabel, in the flexed child burial from Mound 6, but it may have been present in some of the other remains which were not adequately preserved.

El Rayo

Age and Sex:

Three loci at the site of El Rayo were excavated. A total MNI of 27 individuals have been identified. A total of 15 adults (5 Young Adult, 4 Middle Adult, 1 Old Adult and 5 who could only be classified as Adult), 1 Adolescent, 1 Juvenile, 3 Children, 4 Infants, 1 Fetus and 2 Indeterminates were recovered (**Figure 32: Table of age distribution**). Sex for the adults was mostly indeterminate although two probable males and one probable female were identified. As at Santa Isabel, the state of preservation of the human remains was extremely poor and was compounded by the problem of fragmentary and commingled skeletons.

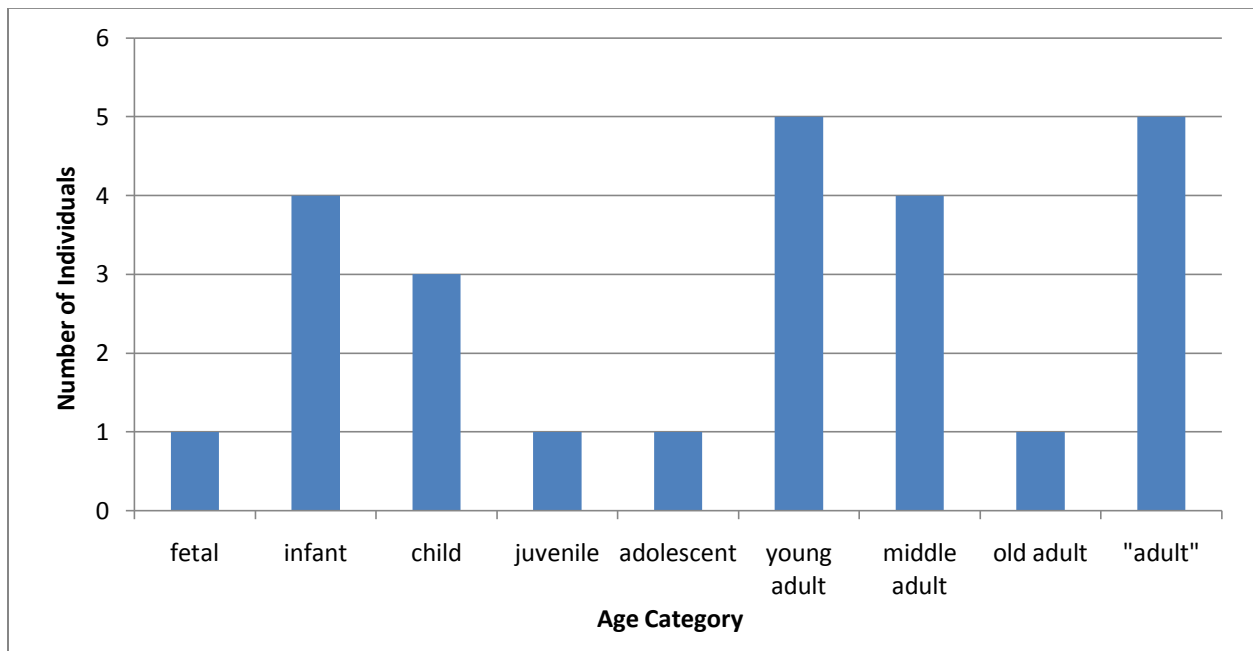


Figure 32: Table of El Rayo age distribution

Dentition:

In general, both supra- and sub-gingival calculus deposits were similar to those at Santa Isabel and were moderate by middle-age. There was some dental chipping on the molars of the

moderately to heavily worn teeth and dental wear was already moderate by young adulthood, advanced by middle-old adulthood. In contrast to Santa Isabel, caries were recorded in several individuals from El Rayo, but these were still present in low frequencies. At Locus 1, one Young Adult (Indiv. 4-1), one Middle Adult (Indiv. 3-2) and one tooth from a commingled burial feature all had a medium size interproximal carie on an adult molar or premolar. At Locus 3, one Young Adult (Indiv. 33-3) had a large occlusal carie on the lower first right molar as well as a small occlusal carie on the second molar. It should be noted that the dentition of this individual exhibited minimal wear.

Antemortem tooth loss was also recorded in two individuals from the El Rayo sample, both from Locus 2. A Middle-Old Adult (Ind. 44-1) had an edentulous mandible with complete socket resorption; essentially, this individual lived for many years with no lower teeth, and the alveolar process grew into a solid bone to compensate for the lack of teeth (**Figure 33: Edentulous mandible from Individual 44-1**). A Middle Adult (Indiv. 26-1) showed antemortem tooth loss of the lower second right molar with evidence of the socket still resorbing at time of death. Additionally, this individual had either non-eruption or a congenital absence of both of their lower third molars.



Figure 33: Edentulous mandible from Individual 44-1

Pathology:

Linear enamel hypoplasias were analyzed in the canines and incisors of nine individuals from the El Rayo sample. These individuals ranged in age from 6.5 to 40 years old and included 2 children, 1 sub-adult, 1 adolescent, 4 Young Adults, and 2 Middle Adults. All individuals had at least one LEH formed during 3-4 years of age and five out of the nine individuals only had one LEH. For those individuals with multiple LEHs, 2 had 2, 1 had 3 and 1 (the youngest of the sample) had 4 defects. All additional LEHs were formed before the 3-4 year old range, with the earliest at ~2 years. No hypoplastic defects (including LEH) were found on any deciduous teeth.

Periostitis is the inflammation of the periosteum of a bone caused by trauma or infection which manifests in the formation of woven bone over the cortical bone (White 2000:392-393).

Several examples of periostitis were recorded in the El Rayo sample. From Locus 1, a Middle Adult (Indiv. 35-2) exhibited heavy pitting and porosity on the anterior-superior border of the right parietal which has been possibly identified as periostitis. In the commingled remains of at least four individuals from Feature 33 of Locus 3, slight periostitis was identified on the mid-shaft of a right ulna, moderate periostitis with slight new bone growth on the shaft was identified on paired radii and marked periostitis was identified on the posterior of a left humeral shaft recovered from Vessel 17. Most likely these examples are all from one individual, but with the state of preservation and commingled remains it is impossible at this point to say so conclusively.

Additionally, one example of osteoarthritis was recorded in Individual 5/7-2 from Locus 1 that exhibited marked osteophytic growth (i.e. lipping) on the body of a thoracic vertebrae. Porotic hyperostosis was also recorded on a probable parietal fragment from a Young Adult (Ind. 40-2) from Locus 3.

Discussion

Given the limitations on in-depth bioarchaeological analyses imposed by the poor preservation of human skeletal remains at Santa Isabel and El Rayo, there is unfortunately little to discuss comparatively. One of the differences between the sites is the difference in the rate of dental caries, which potentially suggests a difference in diet between the two sites, though the differences may also relate to the small sample size of adult and sub-adult teeth from Santa Isabel. At Santa Isabel the complete lack of caries points to a diet low in sugary carbohydrates and starches which contain sugar, while the high levels of sub and supra-gingival dental calculus (i.e. mineralized plaque) found on adult teeth provide evidence for a diet rich in starchy carbohydrates (Hillson 1996). At El Rayo, the levels of calculus appear to be equivalent to those of Santa Isabel, however, the presence of caries in several individual's teeth suggest a diet higher in sugary carbohydrates and starches. Whether this finding represents a true difference between the population's diets or is an artifact of the drastic differences in sample size and ages is unclear, but could potentially be clarified with chemical analyses of the calculus samples.

CONCLUSION

Mortuary practices are among the best known aspects of pre-Columbian Pacific Nicaragua, in part because of the ubiquitous nature of modern looting and resulting rescue excavations. During the Sapoa period, burials are closely associated with the distinctive Sacasa Striated shoe-pots; these were often embellished with appliqué decoration on the 'toe.' Previous excavations have discovered shoe-pot burials throughout Pacific Nicaragua during the Postclassic, but they are not common from the southern, Costa Rican region of the so-called Greater Nicoya culture area. Nor were they used in the preceding Bagaces period, when interments were primary, placed directly in the ground. Thus the use of Sacasa shoe-pots are an excellent temporal and cultural diagnostic, and their introduction during the early Sapoa period provides an important line of evidence in support of wider cultural changes possibly linked to ethnic migrations into the region. However, while ethnohistorical sources indicated that the migrations may have originated in central Mexico, similar mortuary practices are not common in the traditional points of origin for the alleged migration.

Recent excavations at the sites of Santa Isabel, Tepetate, and El Rayo have greatly expanded contextual understandings of the Sapoa period burial practices. At the same time, they have also demonstrated an unsuspected range of variation between these contemporary sites. For example, at Santa Isabel shoe-pot burials were restricted to infants (one vessel had the teeth of three young sub-adults), while adults were interred in and around shoe-pots at Tepetate and El Rayo (and also from burials reported from Ometepe, Managua and Malacatoya). Were the infant burials from Santa Isabel a special case, perhaps relating to their location on and around house mounds?

At Tepetate, articulated adult individuals were placed on top of clusters of about ten burial urns, which appear to have been nested one within another. However, at El Rayo the burials appear to have been secondary, with fragmentary remains both inside of and commingled around the outside of the urns. One example from Locus 1 (Feature 31) did indicate several nested urns that were then crushed, similar to the Tepetate cluster. Furthermore, many of the bones showed signs of having been cremated, adding both to their fragmentary nature and poor preservation. At Locus 1 urns were generally in small groupings of one to three vessels, whereas the large cluster from Locus 3, Feature 33, included at least 12 large urns (plus smaller vessels).

Grave offerings associated with the Tepetate clusters included objects of personal adornment (a greenstone bead and an elaborate ceramic earspool). In contrast, objects of adornment were rare among the El Rayo burials. The two large ceramic earspools from Feature 19 were located near Feature 34, and may have been associated, but were set apart as part of a cache with three bifacial blades and possibly a trophy head. A scatter of about 100 small clay beads were also associated with Feature 34, but probably represent a necklace placed in a small polychrome bowl beside the urns.

In contrast to the relative lack of skeletal remains inside of the El Rayo urns from Locus 1, many of the urns contained small vessels, and also large amounts of volcanic rock. These urns seem to have been placed on prepared surfaces and braced with additional stones and large potsherds. Other sherds were occasionally placed on the interior base of the urns, perhaps as bracing. There was also occasional evidence of a mixed layer of sherds and pebbles over the top of the burial urns at Locus 1.

Feature 32/40 at El Rayo's Locus 3 probably represents the wealthiest set of grave offerings, featuring several polychrome vessels plus exotic goods such as a copper bell, jaguar tooth pendant, bone tools, and a complete (and functional!) ocarina in the form of a frigate bird. The skeletal remains represent at least four individuals, including two young sub-adults represented exclusively by the teeth. The two more complete individuals were a young adult and a late teenager (15-18 years). Both were primary interments with no evidence of associated burial urns.

Feature 33 is unique, from the perspective of the large quantity of urns placed in north/south orientation, and their location adjacent to the possible shrine. While it was not possible to excavate all of the urns, of the four that were investigated only one had significant

skeletal remains, representing a single adult. Other identifiable individuals were commingled around the exterior of the urns, including one individual who had been cremated.

In sum, the Bagaces to Sapoa transition is reflected in a dramatic change in mortuary practices, with the introduction of Sacasa burial urns in contrast to primary interment. Primary burials continued to occur, however, such as among the adult and children from Santa Isabel and the wealthy burial from Feature 32/40. As noted in previous studies, Sacasa Striated shoe-pot urns are ubiquitous throughout Sapoa period mortuary contexts. However, burials from Santa Isabel, Tepetate, and El Rayo use shoe-pots in a variety of ways, suggesting regional variations.

Despite the large number of burials that have been excavated in these projects, relatively little bioarchaeological data is available. Only a single adult was found at Santa Isabel, and most of the sub-adults were represented only by their teeth. The skeletal remains from Tepetate were too fragmentary for recovery – the *in situ* field descriptions indicate that at least some were adult individuals placed on top of burial urns, while other individuals were buried within the urns. While the cemetery contexts from El Rayo Loci 1 and 3 produced hundreds of bone fragments representing numerous individuals, in fact the most distinctive burials came from Locus 2 and were from the Bagaces period.

Despite these inadequacies of the skeletal sample, the detailed bioarchaeological analyses contribute some interesting information about the overall health and nutrition of the prehispanic population. Most notable is the relative lack of dental caries: none were observed from Santa Isabel and only about 1% of the teeth from El Rayo exhibited caries. This is unusual from pre-Columbian populations which consumed maize as a major part of the diet; archaeobotanical studies from Santa Isabel and El Rayo have failed to identify maize among macro- or micro-botanical samples. The conclusion that maize was not consumed is therefore consistent with all lines of evidence, but goes against ethnohistorical accounts of maize at the time of Spanish contact.

The archaeological investigation of mortuary remains provides important insights into past lifeways, effectively ‘raising the dead’ for further consideration. These studies provide important new insights into diachronic and regional patterning that expands on previous studies while allowing more general interpretations. Furthermore, the bioarchaeological analyses represent the most detailed evaluation of osteological data ever attempted, and in conjunction with future DNA and stable isotopic studies this heralds the development of a regional database for Pacific Nicaragua.