5-1-2022

Research Reports, Andean Past 13

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Plants and Diets in Early Horizon Peru: Macrofloral Remains from Rehydrated Fecal Samples at Caylán

David Chicoine (Louisiana State University, dchico@lsu.edu), **Beverly Clement** (Louisiana State University, bevclement1015@gmail.com), and **Linda S. Cummings** (PaleoResearch Institute, linda@paleoresearch.com) report on the macrofloral remains identified in nineteen samples of dried feces recovered at the Early Horizon center of Caylán (800–10 cal BC [2σ]), Nepeña Valley, coastal Peru. Results indicate that maize, one of the most abundant plant remains in Early Horizon deposits, is virtually invisible at the macroscopic level in fecal samples, bringing insights into the ways maize was processed and consumed (*i.e.*, likely in the form of beer and/or flour). Meanwhile, the ubiquity of chili peppers, nightshades, and guava fruits throughout the fecal corpus adds significant information about the diversity of vegetal intake by Early Horizon coastal populations. Indeed, such plants are typically under-represented in macrobotanic remains from archaeological middens.

Beginning during the local Nepeña Phase (800–450 cal BC) and reaching its apex during the subsequent Samanco Phase (450–150 cal BC), groups nucleated at the urban settlement of Caylán while maintaining significant ties to secondary rural and maritime communities who supplied urban dwellers with cereals, fruits, legumes, and seafood (Chicoine and Rojas 2013; Helmer 2015). Carbohydrates appear to have come mainly from the irrigation farming of cultigens, smaller scale gardening of fruits, and collecting wild plants (Chicoine *et al*. 2016). The ubiquity of oversized vessels points to the importance of feasting, especially fermenting alcoholic beverages, in the maintenance of authority (Chicoine 2011). Indeed, it appears that, during the Nepeña Phase, malting techniques related to the treatment of grains (*i.e.*, maize) superseded fermenting starchy tubers (*i.e.*, manioc) (Ikehara *et al*. 2013). At Huambacho, a small Early Horizon elite center located eight kilometers southwest of Caylán, maize remains count for more than sixty percent (NISP [number of identified specimens]=265) of the total plant remains (NISP=465). It is significant that maize is both more labor intensive and riskier than manioc. Indeed, the logistics of maize beer production imply some level of group coordination in order to manufacture sufficient quantities for feasting (Jennings 2005). This suggests that the intensification of maize agriculture involved significant investments of resources. Other edible plants documented in Early Horizon deposits at Huambacho include peanut, lima bean, avocado, pacay, squash, and manioc (Chicoine 2011:449, Table 5).

Over the last three decades, research in the Casma Valley, twenty kilometers south of Nepeña, has yielded significant information to reconstruct patterns of subsistence and human-plant interactions during the Early Horizon. Survey and excavation at the lower valley settlements of San Diego and Pampa Rosario have revealed the presence of several tubers including potato, manioc, achira, and arrowroot (*Maranta arundinacea*) (Pozorski and Pozorski 1987:51–70; Ugent *et al*. 1983). Other food plants include chili pepper, lúcuma, and *ciruela de fraile* (*Bunchosia* sp.). Both the Nepeña and Casma botanical reconstructions are based on

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macroremains from archaeological deposits, typically middens, hearths, construction fills, and floor scatters. The recent discovery of expedient latrine contexts and dried feces at Caylán allows for a more detailed consideration of the plants processed and consumed during the Early Horizon in coastal Ancash.

In 2009, Chicoine and Ikehara (2008[2010], 2014) initiated the first scientific excavations at Caylán, confirming its central place in the development of Early Horizon societies in coastal Nepeña. The sampling of refuse deposits and analyses of macrobotanic remains (*e.g.*, seeds, stems, exocarps) have so far allowed the identification of 35 plant taxa, 18 of which are interpreted as edible. Taxonomic analysis of the plant remains from Early Horizon deposits allowed the identification of 4801 specimens, 2639 of which correspond to edible taxa (Table 1). Most food plants are cultigens including maize (NISP=1310, 49.64 percent), peanut (NISP=643, 24.37 percent), squash (NISP=125, 4.74 percent), manioc (NISP=89, 3.37 percent), common bean (NISP=72, 2.73 percent), jack bean (NISP=27, 1.02 percent), lima bean (NISP=26, 0.99 percent), achira (NISP=15, 0.57 percent), chili pepper (NISP=3, 0.11 percent), and sweet potato (NISP=1, 0.04 percent). Wild or semi-wild edibles are represented by a series of fruit trees including avocado (NISP=199, 7.54 percent), pacay (NISP=53, 2.01 percent), *cansaboca* (NISP=26, 0.99 percent), lúcuma (NISP=22, 0.83 percent,) cherimoya (NISP=15, 0.53 percent), and guava (NISP=3, 0.11 percent), as well as marine algae (*Gymnogongrus furcellatus, Ahnfeltia* sp.) (NISP=2, 0.08 percent), and a possible medicinal plant (*palillo* [*Campomanesia lineatifolia*]) (NISP=9, 0.34 percent). While several of these taxa are identifiable through the macrofloral remains found in the rehydrated fecal samples, the analysis points to significant methodological implications, especially with regards to the processing of certain crops.

PLANT TAXA	NISP	%
Maize (*Zea mays*)	1310	49.64
Peanut (*Arachis hypogaea*)	643	24.37
Avocado (*Persea americana*)	199	7.54
Squash (*Cucurbita moschata*)	125	4.74
Manioc (*Manihot esculenta*)	89	3.37
Common bean (*Phaseolus vulgaris*)	72	2.73
Pacay (*Inga feuillei*)	53	2.01
Jack bean (*Canavalia* sp.)	27	1.02
Lima bean (*Phaseolus lunatus*)	26	0.99
Cansaboca (*Bunchosia armeniaca*)	26	0.99
Lúcuma (*Pouteria lucuma*)	22	0.83
Achira (*Canna sp.*)	15	0.57
Cherimoya (*Annona cherimola*)	14	0.53
Palillo (*Campomanesia lineatifolia*)	9	0.34
Chili pepper (*Capsicum* sp.)	3	0.11
Guava (*Psidium guajava*)	3	0.11
Marine algae (*Gymnogongrus furcellatus*, *Ahnfeltia* sp.)	2	0.08
Sweet potato (*Ipomoea batatas*)	1	0.04
TOTAL FOOD PLANTS	2639	100

Table 1. Edible plant taxa identified in the macrobotanic remains excavated at Caylán (2009–2010).

Materials and Methods

Excavations at Caylán documented a total of 58 features with fecal remains. Those are associated with different contexts including a monumental benched plaza (Plaza-A) (n=15), a 10 meter high mound structure (Main Mound) (n=13), a multi-functional residence (Compound-E) (n=18), as well as streets (n=4), an open public plaza (Plaza-C or Mayor) (n=2), peripheral middens (n=2), and various construction fills (n=4). After their *in situ* identification and recording, the fecal remains were collected, airbrushed, labeled, and bagged in our field laboratory in Nepeña. Of those, 19 Fecal Samples (FSx) were selected for rehydration and transferred to the PaleoResearch Institute in Golden, Colorado for a series of detailed analyses including macrofloral, macrofaunal, protein, starch, phytolith, and pollen. The fecal samples analyzed shed light on deposition events associated with the Main Mound (n=2 [FS105, 106]), the Plaza-A (n=6 [FS71, 77, 89, 101, 124, 125]), Compound-E (n=7 [FS94, 98, 108, 150, 151, 155, 173]), as well as a street (n=1 [FS100]), construction fill (n=1 [FS148]) and peripheral midden areas (n=2 [S154, 159]) (Table 2). This report presents the results of the macrofloral elements.

Fecal Sample (FS)	Unit	Context	Level	Weight (dry) grams
Mound A (UE4)				
105	UE4-Ext2	Mound Summit	4	0.009
106	UE4-Ext2	Mound Summit	2	0.009
Plaza A (UE5)				
71	UE5-Ext3	Corridor 3B	1	0.039
77	UE5-Ext4	Ramp 1	2	0.021
89	UE5-Ext3	Corridor 1B	1	0.017
101	UE5-Ext1	Platform 2A	3	0.021
124	UE5-Ext3	Corridor 1B	1	0.017
125	UE5-Ext3	Corridor 2-B2	3	0.008
Compound E (UE6)				
94	UE6	Room 1	3	0.028
98	UE6	Room 1	2	0.020
108	UE6-Ext5	Room 4	1	0.019
150	UE6-Ext6	Room 4	3	0.020
151	UE6-Ext6	Room 4	3	0.005
155	UE6-Ext3	Room 5	2	0.010
173	UE6-Ext3	Room 5		
Test Units (HP9, HP13, HP16)				
100	HP9		3	0.019
148	HP13		1	0.007
154	HP16		1	0.025
159	HP16		1	0.021

Table 2. List of the fecal samples including their provenance and weight.

The samples were rehydrated and processed through standardized methods using a 0.5 percent aqueous solution of tri-sodium phosphate (Na_3PO_4) and reverse osmosis de-ionized water. Approximately 75 percent of each fecal sample was utilized. The remaining portion was re-packaged and sealed for future analysis. The hydrating samples were covered with plastic wrap to prevent evaporation and contamination, and left to soak. The sample were soaked between 24 and 42 hours, depending on differential rates of saturation. As the samples absorb the tri-sodium phosphate solution, a color pigment is revealed as a result of a chemical process during solution absorption. Considered an important feature when rehydrating human feces, the colors of the Na_3PO_4 solution have been used to differentiate between possible types of depositors (*e.g.*, humans, canines, felines). In this report, suffice it to mention that both chromatic and contextual evidence points to the human origins of the coprolites. The stools were typically lined up against wall lines, in a manner consistent with human squatting. In addition, contexts of deposit are closely related to human activities, including renovation episodes, the abandonment of structures, and the discarding of trash. Finally, their size and overall content are highly consistent with human diets and contrast with typical canine and feline carnivorous diets.

Upon rehydration, each fecal sample was removed from the solution and placed on a piece of clean aluminum foil where it was cut longitudinally. The two halves were laid open, and measured quantities of fecal material were removed from the inside of each stool in order to recover pollen, phytolith, starch, and parasite eggs. Four stools contained fragments of parasitic worms. The remainder of each sample was then water-screened through 0.5 millimeter mesh to recover macrofloral remains.

Preliminary results of the multiple proxy lines confirm the importance of fish in Early Horizon diets (Kováčik *et al.* 2012). Traces of fish remains are ubiquitous and found in 17 of the 19 samples. Vertebrae, otoliths, and scales of small fish were recovered, suggesting that some fish were eaten whole. The presence of marine diatoms, which are typically found on the skin, gills, and in the stomachs of fish, strengthen the hypothesis that small fish were consumed whole. The ubiquity of sardines (*Sardinops sagax*) across Caylán deposits further supports this observation. The remainder of this report focuses on macrofloral remains recovered from the fecal samples.

Results

Taxonomic identifications of the macrofloral remains recovered from the rehydrated fecal samples are based on the recognition of epidermises, seeds, foliage, stems, endosperms, exocarps, and perisperms. The elements identified range in size from less than 0.5 to 1 millimeter. The taxa identified and their ubiquity across the 19 samples provide significant insights into the plants consumed at Caylán. The most ubiquitous remains pertain to chili peppers (*Capsicum* sp.), which are present in 13 of the 19 samples. Other plants recognized in the samples include squash (*Cucurbita* sp.) (n=1), beans (*Phaseolus* sp.) (n=1), maize (*Zea mays*) (n=1), Malvaceae fruit (n=2), *Portulaca* (n=1), guava (n=4), datura (n=1), ground cherry/ tomatillo (*Physalis* sp.) (n=4), amaranth (n=1), and unidentified tuber epidermises (n=4). Flat sedge or nut seed was found in one sample, but it is uncertain whether this taxon constituted a significant food source.

The samples originate from different contexts including (1) the Main Mound, currently interpreted as a civic-administrative building; (2) Plaza-A, a semi-public benched plaza nested within a monumental residential compound (Compound-A); (3) Compound-E, interpreted as a neighborhood-based, supra-household living and production area as well as; (4) street contexts, construction fills, and open air middens. A comparison of the contents of the fecal samples with the associated macrobotanics brings perspectives on the methodological implications of both datasets. A total of 1404 NISP of edible macrobotanics were recovered from the excavation and test units where the feces were found (Table 3). Those can be compared with the presence/absence of the plant taxa identified through the macrofloral remains found in the coprolites (Table 4).

Main Mound. FS105 and FS106 were deposited during a renovation episode, and might pertain to the residents of the area and/or the builders. The stools were preserved by the rapid covering of the fill layers by a plastered floor. The two samples recovered in UE4 are striking by their low plant richness, as only fragments of unknown grassy plants were identified. The absence of fruits, legumes, and other edible vegetal foods common in fecal samples at Caylán is puzzling. Only one other sample, from a street context at HP9, displays similar results.

Plaza-A. Six samples were collected and chili peppers are present in four of them. This is particularly significant because *Capiscum* remains are rare (NISP=3) in the archaeological deposits at Caylán. Other taxa represented include guava–also rare in the excavated refuse (NISP=3)–as well as the common bean and *Solanum*, likely tomato. It is significant that *Solanum* remains are not visible in Early Horizon deposits. The relative richness of macrofloral remains from UE5 may parallel a privileged access by Compound-A residents and/or the special function of the plaza (*i.e*., feasting). The macrobotanics from UE5 confirm the richness of the plant assemblages associated with the use of Plaza-A. All plant taxa represented at Caylán were documented in UE5, with the exception of chili pepper, guava, and sweet potato.

TAXA (FOOD PLANTS)	UE4		UE5		UE6		HP9		HP13		HP16		TOTAL	
	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%
Peanut (*Arachis hypogaea*)	370	52.41	96	30.87	19	13.10	13	61.90	11	5.50			509	36.25
Maize (*Zea mays*)	119	16.86	106	34.08	61	42.07	4	19.05	158	79.00	15	71.43	463	32.98
Avocado (*Persea americana*)	90	12.75	30	9.65	8	5.52			13	6.50	1	4.76	142	10.11
Squash (*Cucurbita moschata*)	18	2.55	28	9.00	37	25.52	4	19.05	12	6.00			99	7.05
Manioc (*Manihot esculenta*)	86	12.18	3	0.96									89	6.34
Common bean (*Phaseolus vulgaris*)			28	9.00	2	1.38			6	3.00	4	19.05	40	2.85
Lúcuma (*Pouteria lucuma*)	4	0.57	3	0.96	10	6.90							17	1.21
Cansaboca (*Bunchosia armeniaca*)	11	1.56	3	0.96	1	0.69					1	4.76	16	1.14
Pacay (*Inga feuillei*)	2	0.28	4	1.29	5	3.45							11	0.78
Lima bean (*Phaseolus lunatus*)	1	0.14	4	1.29	2	1.38							7	0.50
Cherimoya (*Annona cherimola*)			5	1.61									5	0.36
Chili pepper (*Capsicum* sp.)	1	0.14											1	0.07
Guava (*Psidium guajava*)	3	0.42											3	0.21
Marine algae (*Gymnogongrus furcellatus*, *Ahnfeltia* sp.)			1	0.32									1	0.07
Sweet potato (*Ipomoea batatas*)	1	0.14											1	0.07
TOTAL FOOD PLANTS	706	100	311	100	145	100	21	100	200	100	21	100	1404	100

Table 3. Relative frequencies of the plant taxa identified in the different excavated contexts corresponding to the contexts in which fecal samples were collected.

PLANT TAXA	UE4 FS		UE5 FS						UE6 FS							HP9 FS	HP13 FS	HP16 FS	
	A	*B*	C	D	E	F	G	H	*I*	*J*	*K*	*L*	*M*	*N*	*O*	*P*	*Q*	*R*	*S*
Cucurbita																		●	
Phaseolus								●											
Zea mays															●				
Capsicum				●	●		●	●	●	●	●	●	●	●	●		●	●	●
Malvaceae																		●	●
Portulaca																			●
Psidium guajava				●															●
Solanaceae															●			●	●
Datura-type			●																
Physalis seed															●			●	
Solanum			●			●													
Amaranthaceae																			
Cyperus sp.																			
Unknown plant	●	●			●			●		●	●		●		●	●			
Unknown tuber epidermis						●	●					●					●		●

Key:

A	*FS105*	K	*FS108*
B	*FS106*	L	*FS150*
C	*FS71*	M	*FS151*
D	*FS77*	N	*FS155*
E	*FS89*	O	*FS173*
F	*FS101*	P	*FS100*
G	*FS124*	Q	*FS148*
H	*FS425*	R	*FS154*
I	*FS94*	S	*FS159*
J	*FS98*		

Table 4. Presence/absence of macrofloral remains from the rehydrated fecal samples from Caylán.

Compound-E. UE6 excavations revealed several rooms as part of a multi-functional residential compound and fecal deposits are associated with renovation episodes and the abandonment of the place. The seven fecal samples rehydrated from UE6 all contain chili pepper. Unknown grassy plants are also ubiquitous and found in four samples. One sample (FS173) displays more richness and contained maize, Solanaceae, ground cherry, and tuber epidermis. FS173 is the only fecal sample at Caylán to contain recognizable macrofloral remains of maize. Macrobotanics from UE6 deposits, including the construction fill in Room 5, and floor scatters and hearths, are relatively less rich than the assemblage from the Main Mound and Plaza-A. The assemblage is limited to maize, peanut, avocado, squash, common bean, lúcuma, *cansaboca*, pacay, and lima bean.

Street. HP9 is associated with the end of a street located in the northern portion of the urban sector. A single fecal sample (FS100) was found on the street surface. The stool was collected from a layer associated with a floor underneath a layer of windblown sand and dirt, itself covered by the rubble of the collapsed stone-and-mud wall of the street. The presence of feces in HP9 suggests that streets at Caylán were convenient places for defecating and perhaps used as expedient latrines. It is also possible that the street and surrounding neighborhood was abandoned at the time of deposit.

Construction Fill. HP13 was placed at the base of Cerro Cabeza de León in a small room pertaining to Compound-N. The test unit sampled the construction fill of a small bench. A single sample (FS148) was collected from the bench fill, itself composed of refuse and strata of reeds. Our interpretation of the HP13 context exemplifies an expedient latrine, with fill materials quickly covering the fecal deposits and helping in their preservation. FS148 contains chili pepper and a tuber epidermis showing similar cell pattern to that of *Calathea*-type epidermis. Macrobotanics recovered include peanut, maize, avocado, squash, and common bean.

Midden Area. Two samples were collected from HP16 (FS154 and 159) located at the base of Cerro Caylán on the northwestern periphery of the site. There are no obvious structures in this area, which may represent an association of an open-air, expedient latrine and a possible midden refuse area. Our working hypothesis is that most residents of the urban sector probably used areas outside the dense, monumental core to relieve themselves. Yet, those open air latrines would typically have a very low rate of preservation due to natural weathering, and scavenging animals. The stools recovered in HP16 might have been buried by their depositors in association with the discard of trash.

The samples contain large quantities of plant remains including traces of cucurbits. Remains of chili pepper are represented in both samples, as well as the only other trace of guava fruit, unidentified nightshades (possibly tomatillo or ground cherry), unknown tuber epidermis (possibly achira or sweet potato), and remnants of an unknown fruit from the Malvaceae family. The variety in these two samples aligns well with the samples found in UE5 and UE6. The macrobotanics, in contrast, are less rich and include maize, avocado, common bean, and *cansaboca*.

In sum, this brief overview of the distribution of the fecal samples at Caylán contributes to our understanding what the contents of ancient human feces mean in relation to social and economic factors. Yet, it is difficult to correlate the location of defecation with actual occupational phases. It is also difficult to link the use of domestic space with specific defecation moments. UE5 corresponds to a restricted space, where select individuals participated in activities occurring at Plaza-A. Although the feces from UE5 show a variety of consumed plants, they are unique in that they contain the only identifiable remains of *Solanum* and almost all evidence of guava (*i.e.*, other evidence of guava is in HP16).

Compound-E, is associated with residential activities such as cooking, and other food preparation. Aside from FS173, all feces samples from UE6 show a consistent diet primarily of fish and chili pepper. Fecal material can represent food consumed up to forty-eight hours (and longer) prior to defecation, but the uniformity of the samples from UE6 is significant. Considering the amount of information provided by these nineteen fecal samples rehydrated from Caylán, there is a considerable amount of evidence to encourage further investigations into the relationship between Plaza-A and the residential Compound-E. It can be hypothesized that the apparent socioeconomic differences between the people utilizing the space in Plaza-A, largely as consumers, and those utilizing the space in Compound-E, largely as food preparers, are function based.

Discussion

All nineteen samples include at least one *part* (seed, endosperm, glume, stem) of floral remains in either a fragmentary or complete identifiable state. Within the Solanaceae nightshade family, chili pepper remains are present in 68 percent (n=13) of the samples and are in all contexts of the site except for HP9 and UE4. Nightshades including tomato (*Solanum* sect. *Lycopersicon*) and tomatillo or ground cherry (*Physalis* sp.) are present in 26 percent (n=5) of the samples. Maize, tuberous cells, and fruits are also present, albeit in lesser proportions overall.

In the fecal samples where chili pepper is present, the remains are typically fragmented and non-charred, except for the presence of a single charred fragment in FS77 (UE5). The tough seed coats of chili peppers can be broken while chewing, preventing the seed from remaining intact through the human digestive system. FS98 contained the highest count of chili pepper seeds with 131 non-charred fragments (≥ 0.5 milimeters) and 30 chili seed endosperms. Chili peppers are the only plant remains recovered from all samples from UE6, apart from FS173, while the non-floral fragments are all marine or freshwater-based foods—possibly indicative of preferred food combinations within the residential areas of Compound-E. Both food processing and chewing might explain why most of the chili pepper seeds are fragmented and not whole. The multitude of ways that chili peppers can be processed might account for the small amount of actual intact seeds in the feces. Evidence for consuming chili peppers is significant since traditional macrobotanic retrieval techniques, including screen size, used in conjunction with archaeological deposits, tend to underrepresent this important plant.

Several nightshade family varieties are represented including the tomato. Samples from UE5 (FS101, 71), UE6 (173) and HP16 (FS154, 159) all contained evidence for plant taxa in the Solanaceae family as either whole or fragmentary non-charred pieces. FS71 from UE5 contained the highest counts of non-charred tomato *Solanum* sect. *Lycopersicon* remains with 234 whole non-charred seeds, 70 non-charred fragments (≥1 millimeter), and 109 non-charred seed fragments (≥0.5 millimeter). Seeds less than 0.5 millimeters were also present, but not counted. In contrast to residing in the inner cavity of the chili pepper, tomato seeds are contained within a gelatinous membrane. This structural element might account for the high prevalence of whole tomato seeds compared to any other plant seeds found in the feces samples.

Other notable plants common at Early Horizon sites include tubers, fruits, and maize.

The Caylán results indicate the presence of these, albeit in smaller quantities and with more limited spatial distribution. FS148 from HP13 yielded non-charred remains of *Calathea*-type tuber/rhizome epidermis. The same tuberous epidermis was found in FS101 and FS124 from UE5, in FS150 from UE6, and in FS159 from HP16. As suspected, fruits such as guava were consumed at Caylán, but minimal amounts of seeds and traces of endosperm were found in FS77 from UE5 and FS159 from HP16, respectively.

Among all of the edible plant remains found in the feces at Caylán, maize was surprisingly under-represented. This observation is significant, considering the vast quantities of maize cobs found in the macroscopic assemblage. Maize appears only in FS173 from UE6 in the form of glumes and kernel skins. The under-representation of maize in the feces material generates questions about the role of maize at Caylán and the ways by which it was processed and consumed. Maize is well represented in refuse deposits, perhaps because cobs preserve well in the arid environment. Simultaneously, the evidence at Caylán suggests that maize is being processed and consumed in a way that would lessen its visibility in feces–such as being consumed in beverage or flour form. Ongoing analyses of starch grains from the Caylán coprolites should help clarify this issue, since the processing of maize for chicha production can alter their integrity (Vinton *et al.* 2009).

Data from HP16 generate questions about the use of areas outside the urban sector for defecation. FS154 and FS159 from HP16 contained surprising plant richness. Most notable is the large amount of non-charred cucurbit (squash) exocarp and seed fragments in FS154. This is the only sample to contain evidence for consumed cucurbits. Cucurbits are more prevalent in the macrobotanical assemblage, but only in the form of a few intact and fragmented seeds.

Another significant line of evidence in the feces samples is the presence of parasites. Parasitic evidence is found in more than 20 percent of the fecal samples (FS71, 94, 155, and 150). The samples come from Compound-E and appear to be associated with diets consisting mostly of fish and chili peppers. FS71 (Plaza-A, UE5) shows the presence of a parasitic worm, as well as jimsonweed (Solanaceae, *Datura* type), which is a known psychotropic and medicinal plant. At this point, the presence of parasites at Caylán is preliminary and conclusions about general health or access to medicinal aid due to parasitic discomfort are unclear.

Concluding Remarks

The comparative study of macrobotanical remains from feces and refuse deposits is valuable to understand human subsistence strategies, food processing, and the taphonomy of paleoethnobotanical remains. Indeed, the analysis of gut contents from cess, stools, and/or mummified intestines can shed light on variations in food preferences and combinations, as well as cooking and other food processing methods. Fecal specialists have looked at pollen, starch grains, protein residues, and phytoliths to complement traditional emphases on macrobotanical remains and other by-products typically found in refuse deposits (*e.g.*, hearths, discard piles, middens). Microscopic analyses help discern whether plants, seeds, fruits, and tubers were eaten young or mature, if grains were pounded, broken apart, or eaten whole, or even if roots and seeds were roasted before consumption or preferred raw (Vinton *et al.* 2009). Furthermore, feces can present an encapsulated picture of relative health including dietary deficiencies and exposure to parasites. The results from our study suggest that maize is well represented in archaeological deposits, while less visible in the macrofloral composition of coprolites.

The results from our study suggest that maize abundance in archaeological deposits represents intense processing of an important food item, whether ground or used in making chicha. Insights from starch grains could further support the importance of grinding of maize for maize beer fermenting (Vinton *et al.* 2009). Maize stands in stark contrast to chili peppers, tubers, and some fruits which can be difficult to identify in Early Horizon trash piles. Chili peppers in particular are ubiquitous across the fecal samples at Caylán.

The incorporation of feces is a critical addition to the analysis and interpretation of paleodiets and available foods in Andean prehistory. The ability to look beyond botanical remains and incorporate feces data is valuable to the fields of archaeology, paleoethnobotany, and bioarchaeology. Expanding beyond traditional approaches to understand prehistoric populations through architectural features, material artifacts, and burial practices, feces reveal information about food consumption habits. Few archaeological remains other than feces reveal individualist levels of history or specific human events in time.

ACKNOWLEDGMENTS

Excavations at Caylán were made possible thanks to the generous support of Louisiana State University's Office of Research and Economic Development and the Department of Geography and Anthropology. Laboratory analyses were funded by a grant from the Louisiana Board of Regents (contract number LEQSF[2011– 2014]-RD-A-05). Thanks go to the Ministerio de Cultura (formerly the Instituto Nacional de Cultura) del Perú for considering favorably the field project and permitting the exportation of samples (804/INC-050609, 1230/INC-280510, 285-2011-MC), as well as to Hugo Ikehara who co-directed the excavations. Thanks also go to Ámparo Gomez, Kyle Stich, Víctor Vásquez, and Teresa Rosales for their help with the taxonomic identification of the botanical remains.

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Taxonomic Analyses of the Vertebrate Faunal Remains from Caylán, Peru

David Chicoine (Louisisiana State University, dchico@lsu.edu), **Víctor Vásquez** (ARQUEOBIOS, vivasa2401@yahoo.com) and **Teresa Rosales** (ARQUEOBIOS, teresa1905@hotmail.com) report on the analysis of the vertebrate faunal remains from the Early Horizon center of Caylán, Nepeña Valley, coastal Ancash, Peru. Excavations in 2009 and 2010 have yielded some 10 kilograms of vertebrate remains. A total of 3289 Number of Identified Specimens (NISP) were identified, classified, and quantified. Results indicate that Caylán dwellers relied on a variety of fish, birds, and mammals. Mammal domesticates are represented by camelids, dogs, and guinea pigs. Wild mammals such as deer and sea lions appear in lesser proportions. Marine resources occupied a predominant place as suggested by the richness and diversity of the fish assemblage. Most fish were caught from the shore, likely from the nearby sandy beaches located some fifteen kilometers from Caylán. Yet, the existence of fishing satellites nearer to the shore, combined with the nature of the Caylán archaeological assemblage, suggest the existence of exchange networks in which marine products, mostly fish and shellfish, traveled. Wild birds were caught in surrounding marshlands through opportunistic hunting, and appear to have been less important in urban diets.

The Caylán research indicates that the origins of urban life ways in coastal Ancash increased the reliance on animal domesticates for food, transportation, bones, and fibers. Yet, wild animals continued to play a major and dynamic role in subsistence activities, especially fish and shellfishing. Intrasite analyses of species and anatomical distributions confirm widespread exploitation of identified taxa, yet little evidence exists for significant differences in access to potentially more prized animal products.

Caylán is a large multi-component archaeological complex with rich Early Horizon deposits dated between 800 and 10 cal BC (2σ). Results of the excavations, as well as various specialized analyses, have been presented elsewhere (Chicoine and Ikehara 2014; Chicoine *et al.* 2016; Chicoine and Rojas 2013). In this report, we focus on the zooarchaeological analysis of the macrofaunal remains of vertebrates. All excavated materials were screened using a three millimeter mesh. Recovery efforts targeted one hundred percent of the screened remains which were transferred to the Centro de Investigaciones Arqueobiológicas y Paleoecológicas Andinas (ARQUEOBIOS).

Osteoarchaeological analyses focused on unworked bone remains and are believed to represent patterns of subsistence, in particular the acquisition, processing, and discard of meat. Taxonomic identifications were realized using reference collections and published literature for comparisons of each taxon. ARQUEOBIOS houses the most comprehensive reference collection for the zooarchaeology of the north coast of Peru. Numbers of Identified Specimen (NISP) were preferred over weight and Minimal Number of Individuals (MNI). NISP values were calculated based on the number of anatomical parts specific to each species analyzed. Osteometric values were also calculated for camelid remains based on published literature to distinguish between the different taxa. Camelid osteometry focused on the first phalanges of the anterior and posterior limbs. Meanwhile, taphonomic observations emphasized cut, breakage, and other marks indicating butchering and other processing practices.

ANDEAN PAST 13 (2022):456–462.

Taxa	Mound-A (UE1, 4)		Plaza-A (UE2, 5)		Compound-E (UE6)		Others (UE3, HPs)		TOTAL	
	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%
Amphibians/Reptiles										
Bufo sp.	7	0.8			1	0.1			8	0.24
Unknown amphibian			6	0.8	59	6.3			65	1.98
Unknown reptile	9	1.1			20	2.1			29	0.88
Fish										
Mustelus sp.			1	0.1	1	0.1			2	0.06
Carcharhinus sp.					1	0.1	2	0.3	3	0.09
Sphyrna sp.	2	0.2	2	0.3	1	0.1	1	0.1	6	0.18
Rhinobatos planiceps	1	0.1					10	1.3	11	0.33
Rajidae					1	0.1			1	0.03
Myliobatis sp.	6	0.7	7	0.9	2	0.2	3	0.4	18	0.55
Galeichthys peruvianus					6	0.6	4	0.5	10	0.30
Muraenidae							1	0.1	1	0.03
Engraulis ringens			32	4.2					32	0.97
Ethmidium maculatum			2	0.3			1	0.1	3	0.09
Sardinops sagax	50	6.0	92	12.0	137	14.5	99	13.3	378	11.49
Mugil cephalus	5	0.6			4	0.4	18	2.4	27	0.82
Labrisomus philippii							3	0.4	3	0.09
Trachurus symmetricus	3	0.4	13	1.7			6	0.8	22	0.67
Trachinotus sp.	3	0.4							3	0.09
Paralonchurus peruanus	3	0.4	1	0.1	6	0.6	4	0.5	14	0.43
Paralonchurus sp.	2	0.2	1	0.1	1	0.1	1	0.1	5	0.15
Stellifer minor	18	2.1	6	0.8			2	0.3	26	0.79
Cynoscion sp.	37	4.4	10	1.3	16	1.7	34	4.6	97	2.95
Sciaena deliciosa			1	0.1	1	0.1	54	7.3	56	1.70
Sciaena starksi	3	0.4					1	0.1	4	0.12
Sciaena gilberti	2	0.2							2	0.06
Sciaena sp.	5	0.6	16	2.1	21	2.2	15	2.0	57	1.73
Larimus sp.	8	1.0	6	0.8	43	4.6	12	1.6	69	2.10
Micropogonias altipinnis	16	1.9	1	0.1	7	0.7	7	0.9	31	0.94
Pareques sp.							23	3.1	23	0.70
Menticirrhus sp.			1	0.1					1	0.03
Calamus sp.			1	0.1			1	0.1	2	0.06
Caulolatilus sp.							2	0.3	2	0.06
Serranidae			1	0.1					1	0.03
Paralabrax sp.	17	2.0	14	1.8	5	0.5	8	1.1	44	1.34
Acanthistius sp.	1	0.1							1	0.03
Anisotremus scapularis	57	6.8	9	1.2	24	2.5	13	1.8	103	3.13
Merluccius gayi	2	0.2							2	0.06
Scomber sp.	4	0.5			4	0.4	1	0.1	9	0.27
Sarda chilensis	2	0.2	1	0.1	1	0.1	16	2.2	20	0.61
Unknown fish	37	4.4	16	2.1	50	5.3	26	3.5	129	3.92
Birds										
Diomedea sp.			1	0.1					1	0.03
Phalacrocorax bougainvillii	8	1.0	5	0.7	1	0.1	13	1.8	27	0.82
Larus sp.	15	1.8	1	0.1	9	1.0	1	0.1	26	0.79
Laridae	2	0.2	2	0.3					4	0.12
Puffinus sp.							2	0.3	2	0.06
Scolopacidae	1	0.1							1	0.03
Charadridae			2	0.3					2	0.06
Egretta sp.	1	0.1							1	0.03
Gallinula chloropus					1	0.1			1	0.03
Anas sp.	1	0.1	11	1.4					12	0.36
Zenaida asiatica	12	1.4	35	4.6	14	1.5	13	1.8	74	2.25
Zenaidura sp.			1	0.1	2	0.2	2	0.3	5	0.15
Columbina sp.	1	0.1	4	0.5					5	0.15
Strigidae cf Asio sp.							1	0.1	1	0.03
Vultur gryphus	1	0.1							1	0.03
Coragyps atratus					11	1.2			11	0.33
Hirundo sp.			1	0.1			44	5.9	45	1.37
Bartramia sp.			1	0.1					1	0.03
Sturnella sp.	8	1.0			2	0.2	1	0.1	11	0.33
Icteridae			1	0.1					1	0.03
Unknown bird	12	1.4	18	2.4	26	2.8	20	2.7	76	2.31

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Taxa	Mound-A (UE1, 4)		Plaza-A (UE2, 5)		Compound-E (UE6)		Others (UE3, HPs)		TOTAL	
	NISP	%	NISP	%	NISP	%	NISP	%	NISP	%
Mammals										
Muridae	111	13.2	216	28.3	77	8.2	89	12.0	493	14.99
Cavia porcellus	73	8.7	63	8.2	42	4.5	57	7.7	235	7.15
Lagidium peruanum	10	1.2	6	0.8	3	0.3	1	0.1	20	0.61
Canis familiaris	46	5.5	46	6.0	144	15.3	27	3.6	263	8.00
Felis sp.	4	0.5			2	0.2			6	0.18
Unknown carnivore	6	0.7					2	0.3	8	0.24
Otaria sp.	1	0.1			7	0.7	7	0.9	15	0.46
Odocoileus virginianus			1	0.1			3	0.4	4	0.12
Lama sp.	164	19.5	72	9.4	151	16.0	50	6.7	437	13.29
Unknown mammal	63	7.5	37	4.8	39	4.1	41	5.5	180	5.47
TOTAL	840	100.0	764	100.0	943	100.0	742	100	3289	100.00

Table 1. Total vertebrate remains analyzed from Caylán.

Vertebrate Taxa at Caylán

Taxonomic analyses allowed the identification of 3289 NISP (Table 1). The composition indicate that the dwellers of the Early Horizon settlement interacted with, used, ate, and processed a vast array of wild and domesticated terrestrial, marine, riverine, and lacustrine vertebrates including amphibians, reptiles, fish, birds, and mammals. Mammals (NISP=1661, 50.50 percent) account for about half of the NISP values followed by fish (NISP=1218, 37.03 percent), and birds (NISP=308, 9.36 percent). Amphibians (NISP=73, 2.22 percent) and reptiles (NISP=29, 0.88 percent) are marginal. With 36 and 20 species, respectively, fish and bird taxa display overall more richness than mammals (n=8) and amphibians (n=1). The only amphibian identified belongs to the toad *Bufo* sp. Soil sample analyses are currently underway and have revealed the presence of insects, but entomological data are too preliminary at this point to evaluate the potential significance of terrestrial arthropods in human activities.

Fish. Fish are the richest category with some fresh, but mostly salt water species. In our Nepeña (9ºS) assemblage, most marine fish are typical of the Peruvian Province (5ºS–40ºS), although two species (*Larimus* sp., *Pareques* sp.) are also common in the warmer province of Panama (5ºS-5ºN). Marine fish can potentially travel through and inhabit diverse oceanic biotopes including deeper offshore waters, as well as shallower near shore coastlines. Based on documented fishing techniques for the Early Horizon, typical location of fish habitats (mostly demersal and benthonic), and oceanic substrates (mostly sandy), most fish could have been caught in shallow waters (mostly up to forty meters) of the shore of the Bahía de Samanco using a combination of fishing lines, weights, floaters, hooks, and nets.

Overall, the fish assemblage is rich, but exhibits relatively little diversity, with the five most common taxa accounting for more than 60 percent of the fish remains. More than 30 percent of the fish remains belong to sardines (*Sardinops sagax sagax*) (NISP=378, 31.03 percent of total fish), followed by drums and sea basses of different sizes (*Sciaena* sp.) (NISP=119, 9.77 percent). Cabrillas (*Paralabrax* sp.) (NISP=44, 3.61 percent), anchovies (*Engraulis ringens*) (NISP=32, 2.63 percent), giltheads (*Micropogonias altipinnis*) (NISP=31, 2.55 percent), mullets (*Mugil cephalus*) (NISP=27, 2.22 percent), mojarillas (*Stellifer minor*) (NISP=26, 2.13 percent), *Pareques* sp. (NISP=23, 1.89 percent), saurels (*Trachurus symmetricus*) (NISP =22, 1.81 percent), bonitos (*Sarda chilensis*) (NISP=20, 1.64 percent), sting rays (*Myliobatis* sp.) (NISP =18, 1.48 percent), and banded croackers (*Paralonchurus peruanus*) (NISP=14, 1.15 percent) are found in lesser quantities. The low frequency of anchovies and their limited distribution (found only at Plaza-A), are surprising, considering the common presence of these taxon at coastal archaeological deposits. Finally, numerous fish taxa are found in less than one percent of the fish remains including several species of teleost and cartilaginous fish. The latter are rare in the Early Horizon contexts sampled so far at Caylán (NISP=42, 3.45 percent). They include sand sharks (*Mustelus* sp.), hammer sharks (*Sphyrna* sp.), tiburon sharks (*Carcharhinus* sp.), and sting rays (*Myoliobatis* sp.).

Birds. Birds display a less rich, but more diverse assemblage, especially considering edible taxa. Of the total of twenty identified avian taxa, the medium size dove *Zenaida asiatica* (NISP=74, 28.14 percent of total bird remains) is by far the most common and ubiquitous bird at Caylán. More remains of the Columbidae family were encountered (NISP=10). Today, these birds dwell in bushes, trees, and fields in the vicinity of Caylán. In the Early Horizon, wild birds could have been hunted with a variety of projectile weapons including slings and spears, as well as nets. Columbidae are followed by cormorants (*Phalacrocorax bougainvillii*) (NISP=27, 10.27 percent), and seagulls (*Larus* sp.) (NISP=26, 9.89 percent). Wild ducks (*Anas* sp.) (NISP=12, 4.56 percent), medium size icterids (*Sturnella* sp.) (NISP=11, 4.18 percent), and black vultures (*Coragyps atratus*) (NISP=11, 4.18 percent) are also present in lesser frequencies. The remains of vultures are restricted to UE6 in a single context within Compound-E. They are unlikely to have played a major role in local subsistence. A similar observation can be made about the remains of owls (Stigidae *cf. Asio* sp.) and swallows (*Hirundo* sp.). Other marginal species–that could, nevertheless, have played an economic role in Early Horizon Nepeña–include the marshland taxa *Egretta* sp. (NISP=1, 0.38 percent) and *Gallinula chloropus* (NISP=1, 0.38 percent), and marine penguins (*Puffinus* sp.) (NISP=2, 0.76 percent).

Finally, a proximal section of a condor (*Vultur gryphus*) ulna was recovered from Mound-A construction fill. It displays cut marks suggesting the production of musical instruments. Overall, the taxonomic analysis of bird remains indicates the exploitation of the lagoon and marshlands adjacent to the urban settlement of Caylán. Meanwhile, marine taxa appear limited to cormorants and seagulls.

The Caylán zooarchaeological sample is still limited and more research is needed, but the scarcity of penguin remains could be significant, especially since sea lions–who inhabit similar environments–are documented more systematically. It could, for instance, indicate that Nepeña people obtained sea lion products through extra-local exchange networks, including salted meat, teeth for adornments, and bones for tools. Although it implies the more limited movements of penguin products within exchange networks, this working hypothesis is consistent with the near shore fishing strategies postulated for Early Horizon times in Nepeña. Perhaps more importantly, some bird taxa are at the moment completely absent from the Caylán osteological sample. The more salient absence is related to the Muscovy duck (*Cairina moschata*), although the absence of pelican (*Pelecanus* sp.), booby (*Sula* sp.), and heron (*Casmerodius albus*) is also notable.

In sum, bird resources at Caylán appear less systematic and more opportunistic compared to fish and mammalian taxa. Bird domesticates have so far to be documented, and most of the wild taxa include small to medium size animals. Hunting was clearly a significant option to acquire animal protein, but the relatively small size and low demographic densities of these birds do not lend weight to these animal resources being sustainable for a dense urban population. Rather, it appears that Caylán residents more systematically consumed marine fish and shellfish, as well as mammals.

Mammals. At Caylán, the role of camelids appears undeniable as a pack animal, a source of meat and bone, and perhaps of fibers. Camelids dominate the osteological assemblage with 437 NISP for 37.41 percent of all mammalian remains. Our osteometric analysis of camelids focused on first phalanges of three individuals. Results indicate that the three Caylán specimens pertain to a single taxon highly consistent with llamas (*Lama glama*). They are followed by dogs (*Canis familiaris*) (NISP=263, 22.52 percent), guinea pigs (*Cavia porcellus*) (NISP=235, 20.12 percent), chinchillas (*Lagidium peruanum*) (NISP=20, 1.71 percent), sea lions (*Otaria* sp.) (NISP=15, 1.28 percent), felines (*Felis* sp.) (NISP=6, 0.51 percent), and white tail deer (*Odocoileus virginianus*) (NISP=4, 0.34 percent). Llamas, dogs, guinea pigs, and chinchillas are ubiquitous throughout the excavation units, while the distribution of felines, sea lions, and deer appears more limited. It is unlikely that the Caylán felines were consumed as foods. In contrast, llama and dog remains display traces of butchering, and burning.

Anatomical part	Mound-A		Plaza-A		Compound-E	
	N	%	N	%	N	%
Cranium	12	14.8	3	6.1	10	13.7
Thorax	36	44.4	24	49.0	25	34.2
Anterior limbs	11	13.6	8	16.3	22	30.1
Posterior limbs	13	16.0	8	16.3	9	12.3
Feet	9	11.1	6	12.2	7	9.6
Total	**81**	**100.0**	**49**	**100.0**	**73**	**100.0**

Table 2. Anatomical distribution of camelid remains.

For the llamas, the distributional analysis of anatomical parts across the three main contexts of area excavations at Caylán– Mound-A, Plaza-A, and Compound-E–indicates consistency (Table 2). Throughout the excavation contexts, sections of thorax dominate the llama remains, ranging from 34.2 percent of the total llama remains at Compound-E to 49 percent at Plaza-A. Anterior and posterior limbs follow in importance. Meanwhile, remains of crania and feet appear relatively on a par with limbs, depending on the context. Out of the 203 bones recovered at Mound-A, Plaza-A, and Compound-E, cut marks are present on 23 bones (11.33 percent), while 19 (9.36 percent) are burnt. The majority of the cut marks were observed on ribs (NISP=14, 60.87 percent of total cut marks) suggesting that the body parts were especially prized.

Dog remains are surprisingly abundant and ubiquitous at Caylán. All excavation units have yielded dog remains, several of them showing cut marks, in particular on limb bones. Cut marks on limbs indicate that dog meat was consumed. It is significant that Shibata (2013) reports on the high frequency of dog bones in the feasting refuse at Cerro Blanco. While Shibata suggests that dogs might have related to feasting activities and the supplying of high status guests and visitors, the ubiquity of dog remains at Caylán suggests a more widespread consumption, perhaps beyond elite and feasting contexts.

Guinea pigs are also well represented at Caylán. The animals were likely consumed and used in ritual divination and other special activities. Finally, deer, sea lion, and chinchilla are represented in lesser frequencies. Deer were likely hunted from the lomas and adjacent forested areas around Caylán. However, their limited occurrence indicates that this wild game was likely of minor importance in the overall diet, in contrast to domesticated camelids, dogs, and guinea pigs.

Summary and Conclusions

The taxonomic analysis of the vertebrate remains at Caylán indicates that Early Horizon populations in the lower Nepeña Valley exploited different littoral and inland wild resources from diverse biotopes including sandy beaches, fresh water lagoons, marshlands, lomas, and woodlands. The relative importance of each of these in local subsistence and meat input is still unclear, but in light of the richness, diversity and ubiquity of fish remains, it appears the sea provided the most systematic source of animal protein. Most fish remains pertain to small to medium size fish such as sardines, drums, and sea basses likely caught from the Samanco shoreline. Larger fish such as sharks and bonitos are less common. The richness and diversity of fish suggests a combination of various fishing strategies including lines and nets. Fish data suggest that these animals–mainly teleost fish–were at the core of daily subsistence for most people at the urban site. Sea birds and mammals are also present, albeit in lesser frequencies.

The high richness and diversity, yet low frequency of bird remains suggest an opportunistic exploitation of waterfowls and other small birds living around Caylán, perhaps by a limited number of hunters. It is unclear at this point whether these small birds were prized as foods. In contrast, the high frequency and low richness of domesticated mammals point towards a more systematic and intense exploitation.

Animal domesticates were critical to Caylán dwellers, especially llamas for transportation, meat, and fibers. Although it is unclear whether camelids were consistently raised and maintained within the urban settlement, anatomical and taphonomic data indicate that llamas were butchered locally. Whole carcasses were available and diverse body parts were processed, consumed, and discarded on site. Other primary meat sources include dogs and guinea pigs, although they might have been limited to special occasions including feasts.

To conclude, this report has presented and discussed the results of the preliminary analysis of vertebrate osteoarchaeological remains from the Early Horizon urban center of Caylán, Nepeña Valley (Ancash) Peru. Insights into human-animal interactions at Caylán are particularly important to shed light on the process of urbanization that occurred in coastal Ancash during the first millennium B.C. Research indicates the emergence of a dense urban agglomeration where most dwellers could have been detached from primary subsistence activities and supplied by neighboring farmers, hunters, herders, and fishers. Such socioeconomic transformations had a profound effect on animal exploitation.

Results indicate that the Caylán deposits contain a rich assemblage dominated by mammals, fish, and birds. In terms of richness, most are wild taxa, but the higher frequency of camelids, dogs, and guinea pigs indicate the importance of animal domesticates in economic practices. Osteometric analyses indicate that the Caylán camelids were llamas. Although it still unclear whether large scale herding facilities were present at Caylán, llamas clearly occupied a privileged place within Early Horizon diets and socioeconomics. Based on their ubiquity and frequency, dogs and guinea pigs were other significant mammals consumed onsite. Marine fish and shellfish represented another viable, predictable, and heavily exploited source of animal protein. In contrast, birds were preyed upon opportunistically in and around the Caylán lagoon marshlands.

The Caylán osteoarchaeological analysis indicates the trend of increased reliance on animal domesticates, mostly camelids and guinea pigs–which in Nepeña appears to have begun during the transition from the Cerro Blanco to Nepeña Phase around 800 B.C.–gained momentum when people settled into more urban lifeways. The sea continued to provide rich, diverse, and heavy supplies of animal products including fish and shellfish, but llamas probably represented one of the most valued animal resources for transportation, meat, bones, and hair.

Comparisons of zooarchaeological assemblages from neighboring Early Horizon sites suggest the existence of interdependent communities. From that standpoint, urban dwellers were supplied by indirect systems of resource management and distribution. However, little evidence exists at the moment to lend weight to the existence of top-down control from Caylán, the largest settlement and hypothesized primary center of the integrated lower Nepeña system. Rather, animal products appear to have been channeled through a multitude of more or less independent networks. More data are needed on the cultivation practices and the management of surplus crops, but the Caylán animal research calls for a reassessment of hegemonic economic models in the context of incipient urbanism, and a consideration of the complexity and heterogeneity of human-animal interactions in the development of Andean civilizations.

Acknowledgments

Fieldwork at Caylán was sponsored by Louisiana State University's Office of Research and Economic Development and the Department of Geography and Anthropology. Laboratory analyses were funded by a grant from the Louisiana Board of Regents (contract number LEQSF[2011-2014]-RD-A-05). Thanks go to the Ministerio de Cultura del Perú for considering favorably and supervising the field project (excavation permits 804/INC-050609, 1230/INC-280510), as well as to Hugo Ikehara who co-directed the excavations.

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A Peruvian Central Coast Mortuary Assemblage in the Logan Museum of Anthropology, Beloit College

Kylie E Quave (George Washington University; kquave@gwu.edu) and **Christopher Heaney** (Pennsylvania State University, cuh282@psu.edu) report on a Peruvian Central Coast mortuary assemblage in the Logan Museum of Anthropology. This report is the first of a set of three outlining recent analyses–both visual and archaeometric–of an assemblage purportedly originating from a single mortuary context in the Rimac Valley, and with objects dating to the Late Intermediate Period and the Late Horizon. The objects within this assemblage compare with Ychsma and Inca goods from the Central Coast in the centuries leading up to Spanish contact (*c.* A.D. 1050–1532). In this first report we outline the historical and archaeological contexts of the assemblage (its provenance or collection history and its provenience or archaeological find location) and the contents of the assemblage. A brief biographical insight into the assemblage's collector Alpheus Hyatt Verrill (1871–1954) contextualizes relationships between North Americans and Peruvians in the 1920s, a time of practical transition in the wake of hardening legal norms governing excavation and the exportation of artifacts (Heaney 2012).

Collection history

The collection analyzed here was purchased by the Logan Museum of Anthropology at Beloit College in Beloit, Wisconsin (LMA) from renowned explorer, naturalist, and science fiction writer A. Hyatt Verrill in 1929. On 7 August of that year, Verrill offered the assemblage to the LMA as a "mummy bundle from Rimac Valley" that included seventy-six objects: ceramic vessels and a figurine, woven clothing and bags, coca paraphernalia, a quipu "work kit," metal adornments, and various wooden and bone artifacts.

The course by which a North American explorer came into possession of a "mummy bundle" illustrates the difficulties and opportunities of its analysis, and offers insights for the triangulation of other decontextualized artifacts from this era. Verrill is an appropriately challenging vehicle for such an approach. The author of more than one hundred and five books, many of them popular non-fiction, Verrill conducted ethnological and archaeological fieldwork in the Americas, but his interest in antiquities was tinged with controversy from its beginning. Around age 25, he was accused of selling stolen artifacts from Yale University's Peabody Museum (Anonymous 1896). Though newspaper coverage of the scandal referred to him as "Albert Hyatt Verrill," the subject was evidently Alpheus Hyatt Verrill: he was described as the "eldest son of Addison E. Verrill, M.A., professor of zoology and curator of the zoological collection at the museum" and the spouse of "Miss [Kathryn L.] McCarthy." Both of these relationships exclusively describe Hyatt Verrill (*ibid*.). Hyatt Verrill was believed to have absconded with at least $10,000 worth of "curios" (worth perhaps $300,000 today), and the police recovered materials from dealers to whom he had sold the artifacts. Additionally, authorities charged that he had replaced many of the items stolen from the museum with fakes he had crafted to avoid discovery. The newspaper's report emphasized that Verrill had a sound reputation, and that his father took responsibility for minimizing the damages to the Peabody; his father and the Peabody's Curator of Geology–Othniel Charles Marsh, who had been instrumental in the museum's founding and directed it until his death in 1899–asserted the damages were not more than $100 to $1,000.

When Verrill wrote to the Logan Museum in 1929, however, it was as someone who collected antiquities for museums, not from them. In the three decades since the Peabody thefts, he had established himself as a writer, collector of ethnographic pieces, and excavator of pre-Columbian artifacts. His turn to Peru was coeval with the second presidency (1919–1930) of Augusto B. Leguía, whose awards of artifacts and export concessions via executive decree during his first term (1908–1912) had helped harden Peruvian legal norms against the excavation and exportation of artifacts by foreigners (Heaney 2012: 154–156, 185–222). During Verrill's initial visit to Peru, between 1924 and 1926, he met Leguía, and enjoyed a grave-opening expedition outside Lima led by Marshall Saville, of George Heye's Museum of the American Indian (Verrill n.d.). In 1929, he returned with a commission to excavate and collect for Heye. Leguía accepted Verrill's proposal "to collect Peruvian antiquities", and directed him to Julio César Tello, the Harvard-trained director of the first national Museo de Arqueología (MAP), who had previously collaborated with North American anthropologists like Alfred Kroeber (Peters and Ayarza 2013), and now met with Verrill as well.

This association later was used to force Tello from the directorship of his beloved museum. In 1930, after his patron Leguía was overthrown, a series of articles in the revolutionary newspaper *Libertad* leveled several charges against Tello, one of which was that he had colluded with Verrill to smuggle seventeen crates of artifacts out of the port of Callao. Richard Daggett has characterized this smear campaign as less than credible. The accuser signed his salacious articles with pseudonyms and "mixed truth with half-truths and out-and-out lies, wrapped them in patriotic rhetoric, and served them up without a hint of supporting documentation", Daggett concludes. "It was mudslinging pure and simple" (Daggett 2009:32).

The archives of the LMA, the Penn Museum, and the Museo Nacional de Arqueología, Antropología y Historía del Perú (MNAAHP) provide additional perspectives on the politics of Verrill's collecting and selling. During his first meeting with Tello, on 20 March 1929, Verrill revealed that one of Tello's former lieutenants, Antonio Hurtado, had tried to sell him an impressive Paracas textile apparently stolen from the MAP for £2,500, which Tello "immediately proceeded to investigate" (Anonymous 1929–1930); see also Daggett 2009; Peters and Ayarza 2013). Tello's gratitude–and Leguía's prior recommendation– presumably then led the Peruvian to permit the American to excavate and export a collection of artifacts "duplicate" to those in the MAP.

A week and a half after their first meeting, Verrill again visited Tello to request permission, in the name of Heye's museum, to export "24 *huacos* and other objects well represented in the collections of the [MAP]." On 25 April, Tello requested Verrill's credentials, and asked that he submit "to the same rigorous conditions stipulated to Dr. Kroeber in the identical case" (*ibid.*). Verrill seems to have been certain of approval because on 15 April he had written to Penn to offer dozens of objects from mostly coastal prehispanic cultures: Chimú, Nazca, and Inca. He was in Peru, he explained, and "am in an unusual position to secure almost anything that you may require to fill gaps in your collections, and shall be very glad to try to get whatever you want"–apparently on top of what he was collecting for Heye (15 April 1929).

The Penn Museum was slow to respond. Verrill was a "very well known amateur anthropologist", Penn curator J. Alden Mason observed, but "must be dealt with cautiously . . . from a business point of view" (Mason n.d.) and, in the interim, Verrill stayed busy. On 28 April, he and Tello made an excursion to Pachacamac, and in the weeks following he helped document a number of Tello's now-famous unwrappings of Paracas mummy bundles. On 25 May, the museum approved his request to export "21 *huacos*" also "duplicated" in its collection (Anonymous 1929–1930), and on 21 June, Verrill wrote to Penn regarding an additional list of 55 objects, which included the "Contents of mummy bundle from Rimac valley", described below, and a lot of "contents of mummy bundle from Pachakamak consisting of rope netting, basket for carrying loads, basket work receptacle containing mummy of a dog, mummy wrappings, textiles, cotton pouches, small mummy mask of wood, stone beads, etc." (Verrill 1929d). Mason finally expressed interest in the collection, but noted that "the only thing in which we would certainly *not* be interested is the Pachacamac mummy bindle [*sic*]" (Mason 1929, emphasis added), an unsurprising demurral given that Penn's Peruvian collection centered on Max Uhle's 1890s Pachamacac excavations.

The "mummy bundle from Rimac valley", however, went to the LMA. In July, Verrill wrote to LMA curator George Collie to offer artifacts from his collection, composed during eight years of "archaeological explorations" (Verrill 1929b:1). Collie responded with interest, and on August 7th Verrill sent an inventory of 63 lots resembling the second Penn list, with a few objects of the former now excluded–like the "mummy bundle from Pachakamak"–and a few new ones appended. Verrill seemed eager to dispose of his archaeological finds, as he told Collie that he would "be very glad to make a very low and attractive offer if you could take the lot" (Verrill 1929c:1). The only lot purchased was the assemblage discussed here, which Verrill described to both museums as:

> Contents of mummy bundle from Rimac valley consisting of: Textiles, pouches, "medicines", hard wood weapon, silver collar, necklace of seeds and nuts, necklace of copper objects, bronze pin, wooden labret, gourd flasks, bronze crescent-shaped knife, carved wooden spoon, carved wooden llama charm, wooden spatulas, necklace of human prepuces, bronze pincers, wooden receptacle with fringed cotton stoppers, wood and feather head ornament, pottery vessel, mummy wrappings etc. (*ibid*.:3).

Nearly all these objects are now found in a single accession record for the Verrill purchase, which Collie wrote to finalize on 28 August of that year. There was never mention of human remains in the accession records, and no human remains have been found in relation to the objects now in the collection.

Archaeological context

As noted above, Verrill claimed that the LMA objects had come from a single mummy bundle in the Rimac Valley, but while analysis of the remains supports this claim to some extent, there are reasons to be suspicious of Verrill's assertion. For the most part, the objects that possess culture-specific characteristics point to an archaeological provenience in the Late Intermediate or Señorío Period and the Inca Horizon, placing the objects around A.D. 1050–1530, and within the Ychsma/Ychsma-Inca culture area.

The Ychsma were native to the Pachacamac province and became an administrative unit of the Incas after a relatively peaceful annexation around 1470 (Rostworowski 2002:83). Settlements were located within the Lurín, Chillón, and Rimac Valleys (Díaz and Vallejo 2002:357–358). As a macroethnic group, the Ychsma were composed of smaller polities integrated within the larger region (Rostworowski 2002:82).

Ychsma-Inca funerary contexts on the Central Coast include both simple subterranean graves and elaborate above-ground structures.

Individuals were interred in seated, flexed position and wrapped in layers of textiles and bundles of raw cotton, with a net or reed mat around the exterior. Bundles included food-stuffs, textiles, raw cotton, gourds, metal goods, and other, smaller bundles (Díaz 2004, 2015; Eeckhout 2002; Frame *et al*. 2004, 2012; Owens and Eeckhout 2015; Takigami *et al*. 2014; Uhle and Shimada 1991 [1903]). Some funerary bundles contained more than one individual, as may be the case for the LMA assemblage. Because the bundle was brought to the museum already opened and without human remains, it is impossible to know what else, if anything, was interred with it. Some of the intially catalogued artifacts have not been found in recent years, namely the "bronze crescent-shaped knife", the "necklace of human prepuces" (which would be unusual), a bronze pin, and a silver collar.

Contents of the assemblage

Ceramic objects. Three ceramic objects arrived with the Verrill assemblage: a hollow human figure (Figure 1), a provincial Inca narrow-mouth jar (aryballoid vessel) (Figure 2), and an Ychsma bottle (Figure 3). The figurine resembles Late Ychsma examples (Vallejo 2004: figure 19); it depicts a person standing with arms at the belly. Its face was sculpted in a form similar to the style of Central Coast wooden mummy mask,s and the head was painted in black and white to emulate a head ornament. Pronounced breasts are reminiscent of female characteristics.

The narrow-mouth jar is the most common Inca vessel form found throughout the provinces and imperial core, and is used for storing and serving *chicha*. The Ychsma bottle is decorated with an avian figure on each side (the same avian figure depicted in carved wood described below). The globular body, beveled and incised mouth, paired round handles, and surface decoration are all consistent with the Late Ychsma style, which continued to be produced into the Late Horizon (Feltham and Eeckhout 2004; Vallejo 2004).

Figure 1. Hollow ceramic human figurine (Logan Museum of Anthropology, Beloit College (LMA) 1193.1).

Figure 2. Provincial Inca narrow mouth jar (LMA 1177.2).

Woven objects. The woven objects in this assemblage include coarse exterior wrappings, as well as fine tapestry weaves and cloth bags. Remains of the outermost layers of a mummy bundle–three pillowy beige-and-brown weaves of unspun or loosely spun fiber–point to an adult-sized bundle seated in a flexed position (Figure 4). Many Late Horizon bundles in the Rimac Valley had a "thick layer of unprocessed cotton fiber just below the outer wrapping cloth" (Frame *et al*. 2004:817, 2012:51), around the face, or lining the bundle in all areas (Díaz 2004:587, 2015:193); the LMA assemblage includes tufts of beige and brown raw cotton, as well as bundles of raw cotton wrapped in cloth.

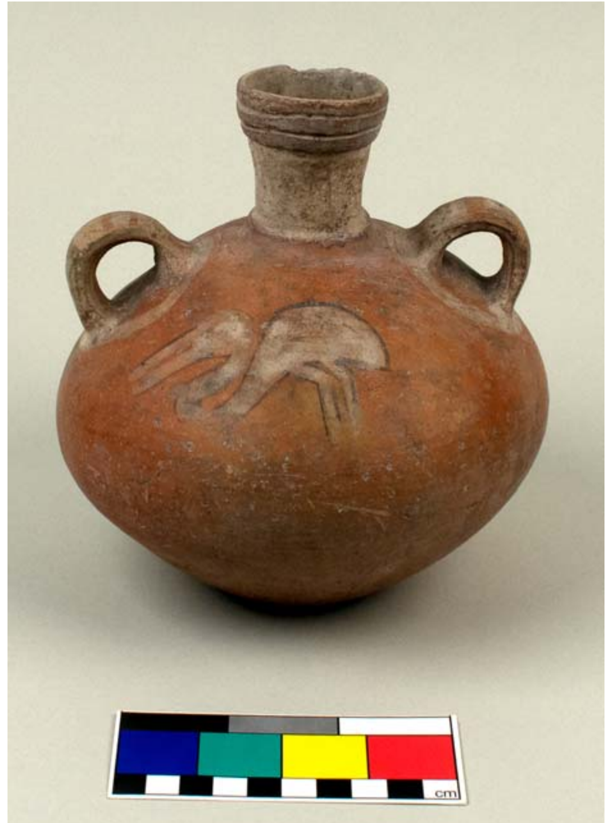

Figure 3. Ychsma bottle (LMA 1177.1).

Figure 4. Fragments of outer wrappings of mummy bundle(s) (LMA 1176.1, 1176.3, 1176.2).

Figure 5. Packages of fiber and seeds (LMA 1195.31, 1195.34).

Figure 6. Cotton pouches (LMA1195.16, 1995.33).

There are often miniature bundles of raw fibers found; a bundle at Rinconada Alta (Puruchuco, Rimac Valley) contained leaves, threads, vegetal fibers, camelid fiber, burnt seashell, decorated tunics, and a loincloth (Frame *et al.* 2004:829). In the LMA assemblage, there are two prepared packages: one contains raw vegetal fiber and spun and plied red and beige camelid fiber (Figure 5a), and the other contains raw cotton and seeds (Figure 5b,c). There are additionally five natural cotton pouches with long, twisted fringes–four are tied to each other–and all contain raw cotton (Figure 6).

Figure 7. Adult size cotton tunic. LMA 1195.26.

An adult-sized brown cotton tunic (Z-2S) (Figure 7) was made from four fragments joined by overcast stitches. The waist has a lozenge-shaped open-weave (d'Harcourt 1962:55–56) and Z-twist fringe and it resembles a Central Coast tunic in the Ethnological Museum in Berlin (Bjerregaard and Huss 2017:145). Three cotton crepe-like loincloths have a flaring shape created by manipulating the tension of the wefts. Flared loincloths like these are distributed from the Rimac Valley to the Chincha Valley and are associated only with Ychsma burials; often there are several in a burial (Frame *et al.* 2012:65–67). Two in the LMA assemblage are a faint blue (Figure 8), while the third is a natural beige color (Figure 9). A vegetal fiber hairnet (see Bjerregaard and Huss 2017:158) was constructed with regular and irregular mesh network by means of square knots and simple knots (Figure 10).

There are also dozens of fragments from unidentifiable objects, including plaid and striped plain weaves, in combinations of beige, brown, orange, and blue, as well as cotton gauze weaves—one with resist-dyed brown background with beige circles (perhaps Chancay), a pinkish gauze, and an indigo gauze (Figure 11)–and tapestry weaves and brocaded pieces. Brocading, which uses wefts that float over the ground cloth to create surface patterns, is a common technique among elite Ychsma textiles (Frame *et al*. 2012:46), which often feature fish designs in brown, tan, beige, and blue.

Figure 8. Loincloths (LMA 1195.10, 1195.18).

In the LMA assemblage there are tapestry fragments featuring brocaded scales (Figure 12) and rows of catfish (Figure 13). A slit-tapestry and interlocking tapestry patch–a type predominant in Ychsma assemblages (Frame *et al*. 2012:45)–features an anthropomorphic figure adorned with a "feathered" headdress and earspools wearing a blue, green, red, and yellow tunic- or dress-like garment (Figure 14). The weaving is finished on the remaining ends like tapestry patches found at Ychsma sites, which often feature blue, green, and pink dyes and were likely originally connected to a larger mantle or burial shroud (Feltham 2017).

Four bags–three with straps–may be *chuspas* for carrying coca (Figure 15). At least three were stuffed with organic materials. A brown- and beige-striped plain weave pouch contains a bundle of vegetal fiber (Figure 15 lower left). Another was stuffed with cotton seeds and brown and beige raw cotton and has red-and-purple-dyed camelid fiber stepped designs on the exterior (Figure 15 upper left). Its ground cloth was constructed of a beige cotton plain weave with single-faced supplementary weft floats forming the stepped pattern. Blue and beige cotton double-faced warp-faced weave makes up the strap and there are brown cotton tassels wrapped in red camelid threads. The largest *chuspa* was woven of beige, brown, and dark brown camelid fiber (Figure 15 lower right). Its body was made of warp-faced plain weave and plaiting that formed vertical stripes. There are plaited side seams with zig-zags and diamond shapes, and the strap is a tubular double cloth that resembles a *chuspa* found on the side of a mummy at Rinconada Alta (Frame *et al*. 2004: 841).

Figure 9. Loincloth (LMA 1195.23).

Figure 10. Hairnet (LMA 1195.12).

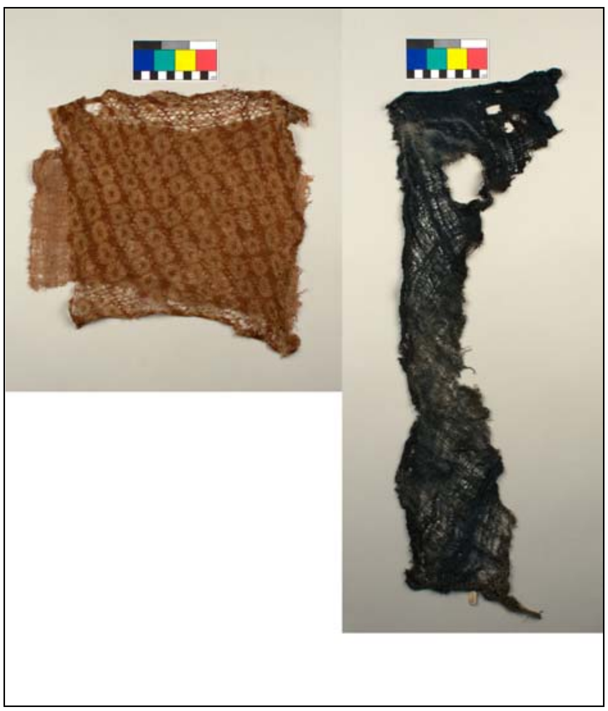

Figure 11. Gauze (LMA 1195.11, 1195.13).

Figure 12. Tapestry band (LMA 1195.19).

Figure 13. Tapestry bands (LMA 1195.20, 1195. 25).

The most common weaving techniques in the Ychsma culture were: (1) "Z-spun singles, often paired or trebled, in the cotton ground wefts of tapestry and in the supplementary wefts of brocade" (with a preference for cotton) (Frame *et al*. 2012:69), (2) S-spun singles in the warp and weft of loincloths and in tie-dyed mantles, and (3) Z-2S warps (Frame *et al*. 2012: 69). Of some forty-five textiles or textile fragments in the LMA assemblage, the plain weave textiles and gauze loincloths match this pattern. The objects that veer from expectations for Ychsma construction techniques include: (1) several fragments of tapestry bands decorated with fish motifs (Figures 12, 13); (2) one of five fringed, natural cotton bags (Figure 6 left); (3) a red and purple pouch filled with cotton seeds (Figure 15 upper left); (4) an indigo-dyed gauze (Figure 11, right); and (5) a plaid fabric wrapped around cotton and seeds (Figure 5b, c). The bundles and bags containing fibers are consistent with Ychsma mummy bundle contents, as is the presence of a variety of *chuspa* types. However, there are no distinctly Inca woven objects.

Figure 14. Tapestry bands (LMA 1195.4).

Figure 15. Bags (LMA 1194.1, 1194.5, 1194.3, 1194.2).

Figure 16. Gourds (LMA 1186.1, 1186.2, 1186.3, 1186.4, 1186.5).

Coca paraphernalia. In the Ychsma region, coca leaf is not prevalent within burial populations. In a study of burials at the Puruchuco sites of Huaquerones and 57AS03, just nine of 209 individuals were interred with coca or coca paraphernalia (bags and lime gourds) (Murphy and Boza 2012). Those burials with paraphernalia were elite or intermediate status persons, featuring more elaborate burial treatment and a greater number of burial goods. There are multiple types of coca paraphernalia in the LMA assemblage, including *chuspas* and lime containers. In addition to the *chuspas* described above, there are five small gourds (Figure 16). All or some may be lime containers (*póporos* or *caleros*; see Uhle and Shimada 1991[1903]:70, figure 99). Three are gourd bottoms stoppered with carved wood (two) and hollow cane (one); the latter resembles other objects accompanied by a dipping spoon for extracting lime from the gourd. There is also a miniature round gourd bowl and an elongated pyroengraved gourd. Wooden-stoppered and round gourd lime ash containers have been identified at Rinconada Alta (Frame *et al*. 2004:841, 849) and Puruchuco (Murphy and Boza 2012:193), but do not often occur in such high quantities in a single burial context.

Figure 17. Quipu "work kit" (LMA 1194.4).

Figure 18. Carved wooden face (LMA1182.2).

Quipu "work kit". In the LMA assemblage, an additional *chuspa*–a light brown and dark brown twill ground cloth bound with overcast stitches–contained materials identified as a quipu "work kit" (Figure 17). The bag was first opened by the LMA in 2013, as evidenced by the friable nature of the intact threads within the pouch and the fixed shaped of the contents relative to the pouch. Within the bag, we removed a damaged, incomplete cotton polychrome quipu, prepared cotton quipu cords, vegetal fiber netting, and a braided strand of vegetal fiber. The incomplete quipu consists of six pendant cords on a broken main cord (five of them knotted with values from 102 to 111); additionally, there are three fragmentary pendants with partial loops prepared for an attachment to a main cord, eight whole prepared pendants, five knotted ends of pendants, and eleven pendant fragments. Loose quipu cords have been identified previously (Ascher and Ascher 1981:22), including with a package of quipu (Urton 2014:15–16, 49–51). The Pachacamac package, like the Logan quipu bag, contained vegetal fiber netting. At Armatambo several individuals were interred with quipu (Díaz and Vallejo 2002:370).

Figure 19. Wooden tools or weapons (LMA 1182.1, 1192).

Other organic and metal objects. Verrill labeled several objects as "medicines." A carved wooden red face (also called a "mummy mask") is like many other archaeologically-recovered examples from the Central Coast that are associated with false head mummy bundles from the Early and Middle Ychsma Periods, which is earlier than they hypothesized date for this Ychsma-Inca assemblage (Owens and Eeckhout 2015; Takigami *et al*. 2014:326, 328) (Figure 18). Two long, carved wooden implements of unknown use appear similar to finds described at Rinconada Alta (Frame *et al*. 2012): a thinner, polished wood stick may be a weaving tool, while a larger elongated object made of heavy wood (weighing 526 grams) may be a weapon (Cobo 1990[1653]:218) (Figure 19). A carved wooden spoon with a step pattern motif at the end of the handle (Figure 20) resembles spoons recovered in Inca strata at Pachacamac (Uhle and Shimada 1991[1903]:94–95, plate 18, figure 18).

Figure 20. Spoon (LMA 1184).

Figure 21. Ornament LMA 1178, 1193.8).

Among organic objects not characteristic of particular periods is a small head ornament adorned with orange feathers that was accompanied with a note from Verrill that "the feathers on this piece were beyond saving so have [*sic*] replaced with some from another grave" (Figure 21 left). It resembles objects in the American Museum of Natural History that were reportedly found in an elite tomb near Trujillo (King 2012:176). Another feathered object appears to be in its original condition: a plume or tassel with white feathers attached by vegetal fiber cords (Figure 21 right). This may have been a stand-alone object or part of a headdress (King 2012:155, 176, 182–183). The assemblage also contains two wooden stoppers, a tubular bone bead, a wooden pin through a white stone ornamented with nine round impressions, and a wooden tube with cloth-wrapped stoppers (possibly for holding needles) (Figure 22), as well as three polished bone needles tied to beige camelid fiber cordage, a wooden avian head in the same form as the bird on the Ychsma vessel described above, a wooden llama figure, a three-lobed ceramic bead or spindle whorl resembling a squash with comma-shaped bas relief, and a perforated black *Nectandra* sp. (*ishpingo*) seed (see Eeckhout 2002) (Figure 23). Necklaces of seeds are commonly found in Ychsma bundles (Díaz 2015, Frame *et al*. 2004:844): the example in the LMA assemblage is made of cotton and vegetal cords with four seeds hanging on pendant strings from two to three drilled holes (Figure 24).

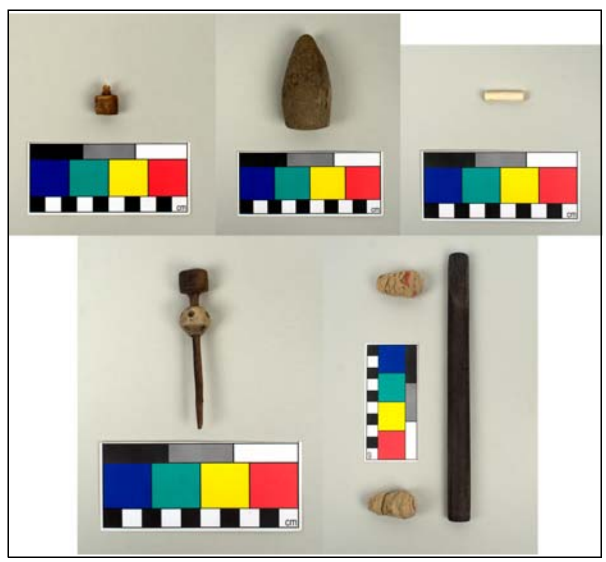

Figure 22. Miscellaneous objects (LMA 1187, 1193.7, 1193.9, 1193.4, 1179).

Figure 23. Miscellaneous objects (LMA 1193.10, 1193.5, 1183, 1193.2).

Figure 24. Seed and cord necklace (LMA 1190).

Nine metal objects in the assemblage include a bronze hummingbird head figure, a silver band, a single bronze tweezer, and a string of six bronze tweezers connected by cotton cordage. All were analyzed microscopically and chemically and are described in further detail in the third report by Hoffman, Peck-Kriss, and Quave.

Relevance of the collection

The LMA assemblage may be either an incomplete set of surviving materials from a mortuary context or a melange from more than one discrete mortuary context. The social, legal, political, and scientific context for Verrill's export and delivery of this "mummy bundle from Rimac Valley" offers evidence for both possibilities. It must be underlined that Verrill had engaged with some of the more prominent archaeological figures of Peru and North America at the time; had participated in expeditions and excavations outside of Lima, in the Rimac Valley and at Pachacamac, that could have easily produced a "mummy bundle;" and–via Tello's unwrappings–had witnessed firsthand the relatively new practice of maintaining the integrity of grave lots for collection, display, and study (Heaney 2017). Yet it could be objected that all of the above would have also exposed him to the utility–and potential profit–of assembling and presenting unique artifacts as a unified grave lot in order to find a buyer.

Comparison with assemblages from scientific excavations of contemporaneous burials in the Rimac and Lurín Valleys indicates that some of the material fits the expectations for an Ychsma-Inca mortuary context. Other remains, however, complicate this identification: the wooden mummy mask may date to the early Ychsma Phase, there are more *póporos* than usual, and the resist-dyed gauze may be Chancay. Yet, the exceptional aspects of this assemblage do not unequivocally indicate that it is not a single bundle. Future archival research into Verrill's affairs may shed light on these semi-provenienced objects. Investigating the background and motivations of Verrill, as the collector, is useful for reconstructing the potential archaeological find locations of such collections, and for understanding the social contexts of collecting in the past century. If future research into Verrill's activities in Peru indicates that the assemblage is what he sold it as, then we may analyze the social and political identities of a deceased individual *vis-à-vis* an Inca provincial context.

ACKNOWLEDGMENTS

We appreciate the guidance and assistance provided by Bill Green and Nicolette Meister of the LMA. Funding for Quave's postdoctoral fellowship was provided by the Arthur Vining Davis Foundations. Funding for Heaney's research was provided by a Fulbright-Hays Graduate Fellowship, administered by the Fulbright Commission of Peru, the Institute of International Education, and the Andrew W. Mellon Foundation; he thanks Alessandro Pezzatti, the archivist at the Penn Museum, and Alexander Ortegal, the archivist at the Museo Nacional de Arqueología, Antropología y Historía del Perú, for their assistance. Maeve Skidmore, Bill Green, Dan Bartlett, and Nicolette Meister generously provided feedback on drafts of the original manuscript. We thank four anonymous readers and Monica Barnes for observations significantly improving this work.

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Identification of Pigments from a Late Central Coast Textile Assemblage

Alicia Hoffman (University of Wisconsin Madison; abhoffman3@wisc.edu) and **Kylie E. Quave** (George Washington University; kquave@gwu.edu) report on the identification of pigments from a late Central Coast textile assemblage in the Logan Museum of Anthropology at Beloit College.

The previous report on the Logan Museum of Anthropology's (LMA) "Rimac Valley mummy bundle" assemblage addressed visual analyses of the materials in the collection purchased from A. Hyatt Verrill in 1929 (Quave and Heaney 2022). However, our research team[1] also conducted preliminary analysis of pigments on the dyed textiles in this collection. Of twelve textiles analyzed, we tentatively identified the source of the colorant for three specimens using multiband imaging, a low-cost and accessible technique described here.

Use of instrumentation in archaeological analysis allows the researcher to ask deeper questions than those suggested by visual analysis alone, and is especially valuable and powerful for learning from decontextualized museum collections. One can determine age, trace the production of an artifact, identify the source location(s) of manufacturing materials, categorize wear and use patterns, or observe movement of the object over time. Because there is often more than one technique available for a particular research question, it is important to consider the merits of each relative to the level of analysis required (Shugar 2013). For preliminary analysis, non-destructive techniques are often best. Destructive sampling requires either removing or irreversibly changing a part of the object being studied, and is, thus, not preferable in museum contexts. Non-destructive sampling limits the instruments available to a researcher, but there are still techniques for testing at every level of analysis.

Three levels of analysis–macroscale, microscale, and elemental–return different types of data (Price and Burton 2012). While elemental analyses are attractive, they are not always the most useful (Bradley *et al.* 2012; Howard *et al.* 2012; Shugar 2013). To identify pigments on a surface, elemental analyses can be too detailed, because many colorants have similar elemental compositions (de la Fuente 2005; Howard *et al.* 2012; Riccardi *et al.* 2013). Colorants can also be organic or inorganic, so an elemental technique must be able to identify both types of compounds. At a macroscale level, colorants have characteristic absorbance spectra. Techniques that work with visible and ultraviolet light absorbance spectra are most useful for preliminary colorant analysis.

Methods

Multiband imaging fulfills these needs at the macroscale as an uncomplicated way to isolate materials that absorb light in particular sections of the visible spectrum (Cosentino 2014; Dyer *et al.* 2013). For this technique, a full-color camera lens is blocked with a colored filter band. Only wavelengths of the filter can pass through and be detected (photographed) by the camera. Using several different bandpass filters, simplified absorbances of the colorants can be photographed. By layering these bandpass images together in a program such as Photoshop, one can see the patterns of absorbance. The analysis should be followed with elemental testing to confirm tentative identifica-

[1] The team, headed by Kylie E. Quave, includes Christopher Heaney, Alicia Hoffman, and Reed Peck-Kriss.

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tions (Fischer and Kakoulli 2006; Riccardi *et al.* 2013). However, it is an excellent method for low-cost, rapid, and non-destructive preliminary identification with minimal equipment.

Multiband imaging is not an absolute technique, and requires standards for reference. In our analysis, a standards sheet was made of several common ancient and historical colorants. All standards were painted on 460 millimeter x 570 millimeter sheets of Whatman Number 1 filter paper (CAS number 1001-917), in one centimeter by one centimeter boxes. A ten percent gram per milliliter gelatin solution was made with Fisher Scientific granular gelatin (CAS number 9000-70-8) and heated on a stir plate with low heat until all gelatin was dissolved. Dry pigments were mixed with between two to four drops of heated gelatin to the consistency of a watery paste.[2] Most pigments were diluted twice in the course of painting to provide a scale of color variation.[3] Three total one centimeter by one centimeter squares were painted in a row for each pigment, with highest concentration on the left and lowest concentration on the right.

Results

To assess whether indigo was used to dye the loincloths, we conducted a multiband imaging study to tentatively identify pigments (Delaney *et al.* 2005; Fischer and Kakoulli 2006). The objects and standards sheet with ancient and modern dye samples were photographed under lamps without a filter and with seven different visible light filters ranging from 470 nanometers to 880 nanometers (blue to red) using a Nikon D50 DSLR camera. Images were layered in Adobe Photoshop CS6 and compared using difference mode to highlight areas of difference between layers. We toggled through all possible layer pairs until we found high contrast (very dark or very light) dyed areas. We then compared the same set of filters on the standards sheet to see if there was a clear contrast of similar darkness or lightness for a dye type in the same hue. If there were many possible matches, we did not suggest a dye match. If there was a single possible match, we identified that as a possible match.

Although all apparently dyed textiles in the assemblage were included in the pigment analysis, only three yielded possible matches to the standard sheet. Two were the blue loincloths (Figure 1), which matched well with indigo on the standards sheet. A *chuspa* that was stuffed with cotton seeds and brown and beige raw cotton and which has distinctive red- and purple-dyed camelid fiber stepped designs on the exterior was also found to match the standards sheet (Figure 2). Its red pigment was likely cochineal. Both indigo and cochineal are known colorants for prehispanic Andean textile objects, but their identification on specific objects can potentially contribute to reconstructing broader patterns of craft economies in particular times and places and can perhaps help to identify these objects in terms of specific archaeological cultures.

[2] Pigments on the standards sheet include whites (zinc oxide, zinc sulfide, titanium dioxide, calcium carbonate, and lead carbonate), blues (phthalocyanine blue, azurite, ultramarine, cerulean, manganese blue, cobalt blue, smalt, indigo, and Prussian blue), greens (Egyptian green, fine malachite, coarse malachite, Winsor green, viridian, Veronese green, emerald green, oxide of chromium, terre verte, and Scheele's green), iron oxides (magnetite/black iron oxide, hematite/red iron oxide, and goethite/yellow iron oxide), reds (alizarin crimson, carminic acid, red lead, vermillion, cochineal, and lac dye), and black (ivory black and lamp black).

[3] Two pigments, copper arsenite (Scheele's green) and copper acetoarsenite (emerald or Paris green), were only painted in the most concentrated form in a single square due to toxicity concerns.

Figure 1. Loincloths, Logan Museum of Anthropology, Beloit College (LMA 1195.18, 1195.10).

Conclusions

We suggest that multiband imaging—due to its low cost and easy access for diverse laboratory settings—should be a standard method employed in analysis of Andean textiles. Establishing colorant type as a recorded attribute to help authenticate and/or compare textile objects across collections, cultures, and time periods should lead to broader reconstructions of the significance of archaeological and museological collections.

Figure 2. Bag (LMA 1194.1).

ACKNOWLEDGMENTS

We appreciate the research guidance and assistance provided by Bill Green and Nicolette Meister of the Logan Museum of Anthropology. Funding for Quave's postdoctoral fellowship, under which the research was conducted, was provided by the Arthur Vining Davis Foundation. Portions of this project were funded by National Science Foundation grant number SMA-1156360. We thank four anonymous readers and Monica Barnes for observations significantly improving this work.

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Technological and Chemical Analysis of a Late Central Coast Metalwork Assemblage

Alicia Hoffman (University of Wisconsin, Madison) abhoffman3@wisc.edu, **Reed Peck-Kriss** (Beloit College) redwoodforgeakland@gmail.com, and **Kylie E. Quave** (George Washington University) kquave@gwu.edu) report on their technolgical and chemical analysis of a late Central Coast metalwork assemblage in the Logan Museum, Beloit College, Beloit, Wisconsin.

Nine metal objects were included in the "Rimac Valley mummy bundle" assemblage that A. Hyatt Verrill sold to the Logan Museum of Anthropology (LMA) in 1929 (see Hoffman and Quave 2022 and Quave and Heaney 2022). They are a thin, circular band, a hummingbird head figure, a single tweezer, and a group of six tweezers connected by cotton cordage. All were analyzed microscopically and chemically to determine similarities and differences from each other and from similar scientifically excavated metal objects of personal adornment.

Because this assemblage appears to fit the expectations of a late prehispanic Central Coast mortuary assemblage, we compared these objects to those from other Ychsma and Inca contexts and related cases. Metal objects were transformed in style and technology under Inca rule, including a shift in bronze alloys from arsenical bronzes to tin bronzes (Lechtman 2007). Recent Inca provincial research in the Copiapó Valley of Chile has demonstrated that the change was not encompassing, and that some goods were still produced as arsenical bronzes (Garrido and Li n.d.). Bronzes high in tin content tend to yield the best castings (Gordon 2012:3; Mathewson 1915:538), though tin bronze can also be shaped by cold work followed by annealing (Gordon 2012:12, figure 1.5). Based on Mathewson's original technological hypotheses (1915), studies of Inca tin bronze objects have found that "iron and sulphur were the only impurities present in quantities sufficient to influence their properties" (Gordon 2012:3). Study of Inca tin bronze objects from Machu Picchu has shown that most cast items were cast close to their final form, then worked and annealed to finish them (*ibid.*). In objects that required a hole, the hole was part of the original casting, rather than added later through punching or drilling (*ibid.*). With these diagnostic characteristics in mind, we expected to find objects ranging in levels of affinity with Inca and non-Inca technology and chemistry.

Methods

We conducted chemical analysis of the metals using a portable x-ray fluorescence spectrometer and a scanning electron microscope. The pXRF unit was a handheld Thermo Scientific Niton™ XL3t Ultra Analyzer. It was calibrated prior to use, and was kept immobile in a mount while each object was placed over the detector. Depending on object size, one or two points were analyzed on each object. All samples were analyzed in "General Metals" mode, and we positioned the instrument to analyze areas that exhibited the least amount of surface corrosion to avoid contaminating the semi-quantitative results (Liritzis and Zacharias 2011:123). Nevertheless, our analytical results are most useful when treated as qualitative, presence/absence data. The range of elements tested with pXRF did not include arsenic; thus, our results focus on detecting the presence of tin bronze or some other metal or alloy. We also conducted energy-dispersive spectroscopy (EDS) using a JEOL Scanning Electron Microscope with EDS component and INCA software. Multiple point locations were analyzed for each object, varying spot size, working distance,

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voltage, and magnification as necessary. Semi-quantitative EDS results were used merely to assess the presence and absence of As, as the "General Metals" mode used on the pXRF did not include As detection.

Metal artifacts were also examined under a stereoscopic microscope at a magnification of 40X to determine technological processes involved in their manufacture. Objects were not cleaned or polished, as corrosion patterns can contain relevant information. Attributes examined included surface morphology, evidence of polishing and wear, evidence of layering, and other indicators of manipulation and construction processes such as hammering, pressing, cutting, punching, heating, and bending.

Results

A silver alloy band (Figure 1) is similar to objects referred to as "diadems" and "circlets" elsewhere. They have reportedly been found on false heads in mortuary bundles (Baessler 1902: plate 150) and bundled up in a group with a wooden idol from Rinconada de la Molina at Puruchuco (Vetter 2004:127–129.

Figure 1. Silver alloy band, Logan Museum of Anthropology, Beloit College 1193.3

Like the circlet found here, the published examples are made of hammered silver that is doubled over on each end to encircle a cotton cord that encloses the band to fit a head or other object (Baessler 1906: plates 26, 27; Vetter 2004:127). The fragments of this object were too fragile to assess manufacture by examining the broad sides. Elemental analysis with pXRF (Table 1) revealed the object was made primarily of an alloy of silver (79.5 percent by weight) and copper (18.9 percent by weight). There was enough lead (0.4 percent by weight) present to indicate that a lead cupellation process was likely used to refine the silver, a purification method introduced by the Inca in provincial contexts (Gordon and Knopf 2007; Zori and Tropper 2013:3285). The object was too large to fit into the SEM chamber and was thus not analyzed using EDS.

Figure 2. Hummingbird head figure, Logan Museum of Anthropology, Beloit College 1193.3.

The small hummingbird head figure (Figure 2) features a perforation at the base that may indicate it was attached to another piece of a composite object. The presence of minor amounts of flash that form at the intersections of abutting parts of a casting mold indicate that such a mold was used. The beak appears to have been worked after casting to draw and curve it more finely, and shows a ridge on one of its faces indicative of a drawing process. Elemental analysis using pXRF revealed that the object contains 92 percent by weight copper with major amounts of tin (2.5 percent by weight), silver (1.4 percent by weight), sulphur (1.5 percent by weight), and silicon (1.3 percent by weight). This is consistent with an Inca tin bronze alloy.

Semi-quantitative results from EDS were important for determining whether some of these artifacts indeed contained As in the bronze alloys, especially since pXRF was not used to measure As. We were able to eliminate the possibility that there were arsenical bronzes in the assemblage with the EDS results. One EDS reading (Table 2) for the hummingbird head indicated the presence of As (0.75 percent by weight), but EDS also indicated high levels of Sn consistent with tin bronze alloys nevertheless.

Object	Point	Al	Si	P	S	Ti	Cr	Fe	Cu	Ag	Sn	Au	Pb	Total
Circlet (1195.27)		--	0.267	0.082	--	--	0.332	--	18.92	79.475	--	0.193	0.435	99.71
Single tweezer (1180)	Body	--	0.522	0.029	2.426	0.141	--	0.027	96.44	--	--	--	--	99.59
	Handle	0.522	0.829	0.094	2.078	0.051	--	0.042	96.33	--	--	--	--	99.95
Hummingbird head (1193.3)	Head	0.502	1.384	0.117	2.561	0.06	--	0.075	91.08	1.374	2.7	--	0.101	99.95
	Beak	--	1.717	0.055	1.697	0.067	--	0.095	92.62	1.347	2.236	--	0.116	99.95
String of tweezers (1189)	#1 body	--	1.252	1.264	4.759	0.104	--	0.154	75.43	3.181	13.024	--	0.266	99.44
	#1 handle	0.785	2.285	3.372	3.406	0.098	--	0.197	73.54	2.988	12.783	--	0.285	99.74
	#2 body	--	--	--	--	--	--	0.036	93.47	0.47	5.992	--	0.025	100
	#2 handle	--	1.358	0.264	4.719	0.083	--	0.086	85.4	0.504	7.065	--	0.067	99.55
	#3 body	0.398	0.985	0.06	1.832	0.047	0.054	0.036	96.48	--	0.032	--	0.039	99.97
	#3 handle	0.468	1.523	0.157	3.153	0.052	--	0.055	94.46	--	0.03	--	0.045	99.94
	#4 body	0.457	0.828	0.157	1.814	0.042	--	0.028	94.47	1.03	0.908	--	0.217	99.95
	#4 handle	0.381	1.096	0.322	3.14	0.056	--	0.041	92.46	1.061	1.072	--	0.301	99.93
	#5 body	--	0.909	0.584	3.439	0.101	--	0.405	81.69	--	12.251	--	0.123	99.5
	#5 handle	0.557	1.885	0.34	6.822	0.08	--	0.323	83.62	--	6.188	--	0.054	93.68
	#6 body	--	--	--	--	--	--	0.126	94.44	0.573	4.831	--	0.024	100
	#6 handle	--	--	--	--	--	--	0.357	94.26	0.566	4.778	--	0.039	100

*Elements with very low detection or that do not provide aesthetic or structural characteristics were excluded from this table (V, Zn, Se, Nb, Sb, Bi).

*Table 1. Element weight percentages identified with pXRF.**

Object	*Sample*	*Si*	*S*	*Cl*	*Cu*	*Zn*	*As*	*Ag*	*Sn*	*Hg*		*Total*
Hummingbird head (1193.3)	1		5.14	9.58	77.4			1.93	5.95			100
	2		8.21	9.7	76.72		0.75	2.2	1.79		0.63	100
Tweezer #2 from string of tweezers (1189)	Handle 1	1.16	28.18	2.52	61.59	0.05		2.2	3.86	0.44		100
	Handle 2		3.99	1.5	94.51							100
	Body		10.24	4.54	70.98		0.99	2.54	10.72			100

Table 2. Element weight percentages from EDS for objects with As present.

Tweezers in general are typically found on the Central and South Coasts (Owen 2012: 100). The unstrung tweezer with an ovoid pincer (Figure 3) is perforated at the top, indicating it was likely worn. It exhibits a pattern of scoring on the sides of the body and evidence it was hammered into shape before it was folded and heated to a spring temper. The six tweezers hanging on pendants of cotton cordage and including two small tubular, red-and-white shell beads (Figure 4) exhibit triangular bodies with variations in proportions and degrees of curvature at their bases. A similar pendant ornament of shell beads was recovered in an Inca grave at Pachacamac (Uhle and Shimada 1991[1903]: 95, figure 112).

Like the single tweezer, all the triangular tweezers were worked to shape, then folded, although the holes on which they were strung were punched after the objects were folded. All seven tweezers are bronze alloys; all have differential concentrations of copper with respect to other elements. The tweezers are referred to here by consecutive numbering from left to right, as seen in Figure 4. According to the pXRF results, tweezers 1, 2, 5, and 6 all contained high levels of tin. Silver content was very high in tweezers 1 and 5. All contained less than 1 percent by weight lead. There was minimal gold in all the tweezers and trace amounts of iron, titanium, phosphorus, and silicon. Sulphur content ranged from absent (tweezers 2 and 6) to somewhere in the range of 1.5 wt% to 4.6 wt% for the other tweezers. With EDS, As was identified at .99 wt% on tweezer 2, but as with the hummingbird head, the Sn content was high enough to warrant identification as a tin bronze alloy. Thus, tweezers 1, 2, 5, and 6 are classified as tin bronze alloys. The mechanical puncture of the tweezer holes is inconsistent with Inka heartland metalworking (Gordon 2012:3) but may not conflict with typical coastal workshop practices if these were tin bronzes introduced by the Inka administration locally. There is no definitive technological or compositional evidence for these objects as non-Inka in origin; some were most consistent with the Inka imperial corpus.

Conclusions

Elemental and technological analyses indicate that these metal objects of personal adornment resemble artifacts scientifically excavated in late prehispanic contexts on the Central Coast, with some sharing more in common with Inca contexts and others closer to local culture. Objects like these have specifically been recovered in mortuary contexts including false head mummy bundles. If this assemblage of metals were recovered in a single funerary bundle, we would find that the individual interred with them enjoyed an elevated social status with access to goods produced in discrete specialist contexts.

Figure 3. Tweezers, Logan Museum of Anthropology, 1180.

Figure 4. Tweezers, Logan Museum of Anthropology, 1189.

Acknowledgments

We appreciate the research guidance and assistance provided by Bill Green and Nicolette Meister of the Logan Museum of Anthropology. Funding for Quave's postdoctoral fellowship, under which the research was conducted, was provided by the Arthur Vining Davis Foundation. We thank four anonymous readers and Monica Barnes for observations significantly improving this work.

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Three *Illas* Figurines from Mareniyoc, Callejón de Huaylas, Peru

Victor Ponte (University of Wisconsin, Milwaukee; vmponte@uwmalumni.com) reports on three finds from the Mareniyoc site (PAn 5-37; 9.424595°S, 77.5852°W). This is an artificial mound with multiple occupations from the Early Horizon to the Late Horizon (1500 B.C.E.–1532 C.E.). It is on the eastern foothills of the Cordillera Negra, in the Jangas District of Huaraz Province, Ancash Region, below the Pierina Gold Mine (Figures 1, 2).

A test excavation unit on the west side of the mound revealed a llama figurine associated with Inca domestic levels. Two other figurines found at Mareniyoc, and presented in this report, lack exact archaeological contexts; they were found by local villagers when building houses adjacent to the mound. These objects most likely represent *illas*, small objects with special properties, used as offerings in religious rituals seeking the increase or success of camelid herds.

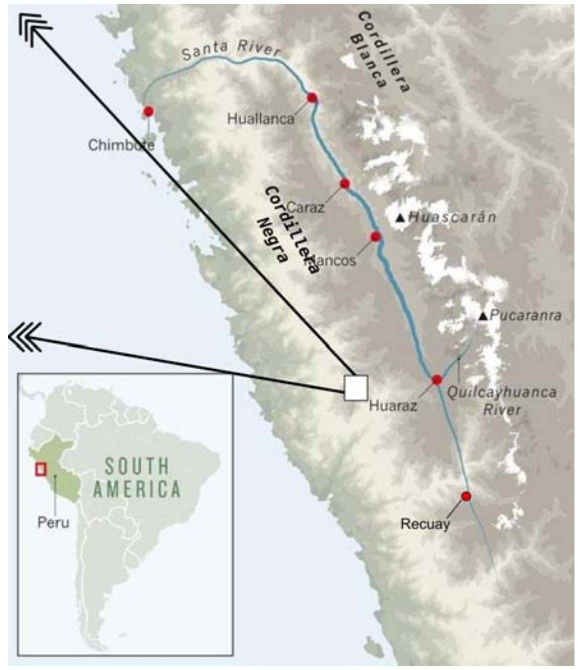

Figure 1: Map of the Callejón de Huaylas showing the location of the study area.

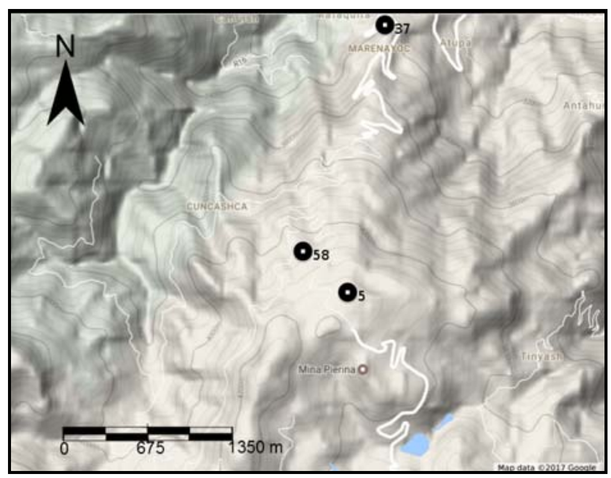

Figure 2: Study area, Mareniyoc, Huaraz Province, Ancash Region. Archaeological sites: 37= Mareniyoc; 58=Llaca Ama Caca; 5=Ancosh Punta.

The Setting and Archaeology

Mareniyoc is in the Quechua ecozone (with elevations averaging about 3,500 meters above sea level), where small agricultural plots of maize, tubers (oca, *olluco* [*Ullucus tuberosus*], potatoes) and some eucalyptus trees are grown. Terraces control the slope and increase areas for crops, but these seem to represent familial efforts, not large scale collective land management. In general, hill ridges do not offer much space for intensive cultivation. In addition to farming, herding was another important activity because the prehispanic occupants of Mareniyoc had access to the puna ecozone (above 4,000 masl), with its rich pastures and undulating topography. Remains of multiple abandoned corrals, seasonal huts, and rock shelters are found in this area. The Quechua and puna ecological zones are integrated by an ancient trail that connects archaeological sites belonging to several periods (Ponte 2009a).

The Mareniyoc archaeological mound measures approximately 82 by 47 meters. It has been gravely damaged by locals for the construction of modern houses. Due to this destruction, many diagnostic artifacts from different periods were observed lying dispersed on the ground surface, among them Inca style sherds. To examine further the cultural deposition, one test excavation unit was placed on the west side of the mound. This uncovered evidence of superimpositions of at least three levels utilizing stone walls and artificial fills (Figure 3).

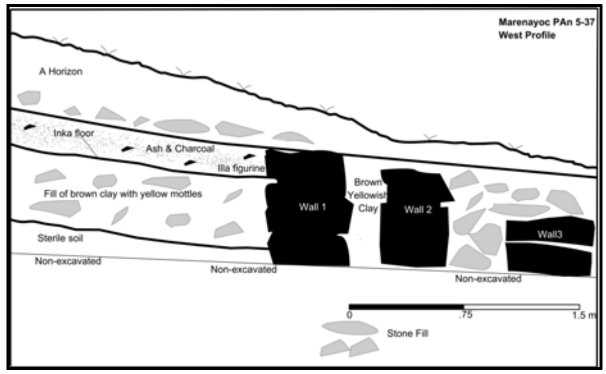

Figure 3: Mareniyoc (PAn 5-37) west profile.

Stratum One, 0.30 meters thick, consisted of a modern layer resulting from a pig pen. Towards the bottom of this layer, an intentional fill of mid-sized stones was identified. Stratum Two, 15 centimeters thick, is a clayish brown sediment mixed with ash and charcoal. Within this midden soil, Inca ceramic jar fragments (60 percent of the sample of Inca ceramics), large cántaros (8 percent), and wide open bowls (32 percent) appeared consistently. Bones from a minimum of 6 artiodactyls (3 adults, 3 young) were found dispersed in a mix of charcoal fragments and Strata Two soil. One of the adults was an alpaca and the rest were llamas. The radius and ulna of an adult camelid presented cuts in the anterior and superior surfaces, corresponding to disarticulation and consumption (Rofes 1999:162). At the north side of this test unit, a wall formed by rectangular stones and mortar appeared. This separated the Stratum Two from a platform at a lower level. A ceramic llama figurine and stone beads were found 0.50 meters below the surface, associated with the midden, and at the top of a stone retention wall. Stone wall 3 had better masonry built with cut stones and is associated with Early Intermediate Period ceramics. However, our excavations were suspended at the request of the local farmer.

Figurines

The best artistic representation of a probable llama is the ceramic figurine with the animal in a sitting or resting position (Figure 4). It is nearly complete. It is 3.8 centimeters long, 5.3 centimeters high, and weighs 30 grams. The rear legs are absent or not depicted. The object is made of plain red-orange paste with no slip, and is modeled. The depiction of anatomical parts is crude, with applique ears and eyes. Incision lines define the ears and mouth, which is semi-open and has the prognathous lower jaw typical of prehispanic camelid depictions. The buttocks of the animal are represented by a slight swelling.

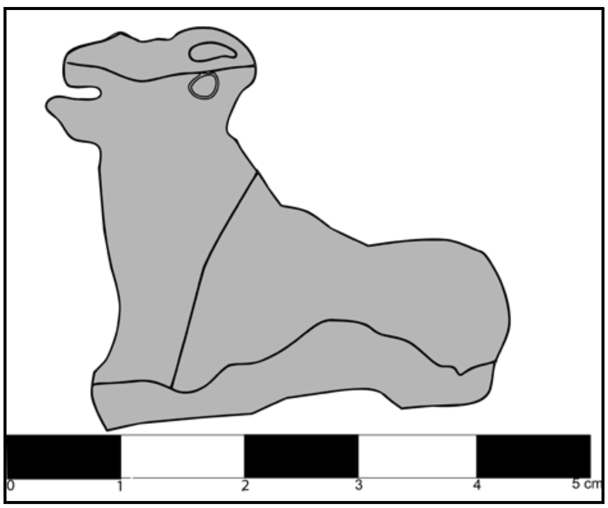

Figure 4: Specimen 94, ceramic figurine found at Mareniyoc, probably meant to represent a llama.

The other two figurines are different from one another, but both are made of stones present in the local environment. The stone figurines range from 7.8 to 8.95 centimeters in length and 3.8 to 3.95 centimeters in height and weigh 105 and 195 grams respectively. Specimen 95 (Figure 5) is made of grey shale, with the animal shape created by grinding with another hard object. It is a complete stone, possibly in the form of an alpaca. In any case, it is a quadruped with short legs, a small head, and a short snout. The body is overemphasized, which may reflect the long, thick fur of alpacas. An incision delineates the mouth and punctations mark the eyes.

Specimen 96 was formed of a bluish gray basalt cobblestone formed by grinding. (Figure 6). It has an exaggerated oblong body, a rounded head, and diminutive feet. The shape is very simple. It may be from the modern era, and probably represents a sheep or a camelid (alpaca) with heavy fur.

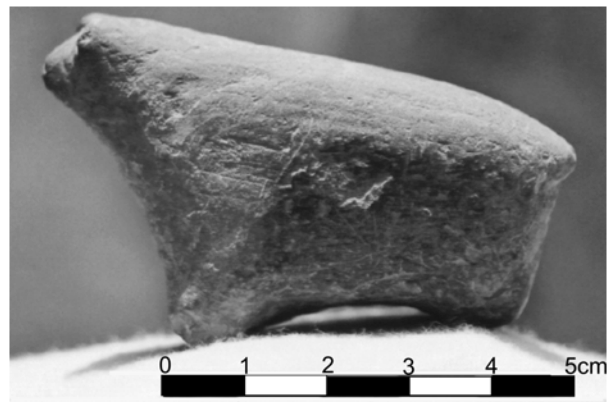

Figure 5: Specimen 95, found at Mareniyoc, a gray shale figurine probably intended to represent an alpaca.

Figure 6: Specimen 96, found at Mareniyoc, a bluish gray basalt figurine probably intended to represent a sheep or alpaca.

Specimen number	Maximum length (cm)	Maximum height (cm)	Maximum body width (cm)	Weight (g)	Material
94	5.3	3.8	2.2	30	Ceramic
95	7.8	5.1	2.4	105	Stone
96	8.95	3.95	3.2	195	Stone

Table 1. Size and weight of figurines from Mareniyoc, Ancash.

The finest camelid figurines found in Andean archaeological sites are from the summits of high mountains, and are associated with Capacocha rituals. Reinhard and Ceruti (2010:137) state that Inca figurines from such contexts were made only of gold, silver, and spondylus shell. However, finds of ceramic *illas* have been recovered sporadically among the remains of Inca domestic feasting and celebration events (*e.g.*, for Cusco see Delgado 2013). In the northern Peruvian highlands, Lau (2010) has found fragments of camelid figurines in refuse contexts. They are made either of pottery or of stone, and can be related to Middle Horizon levels.

Llama Corrals

In the puna zone of Mareniyoc (4,000 masl), a series of corrals were built on gentle slopes and on the flat pampa. The zone next to the Llaca Amá Caca site (PAn 5-58; 9.44538°S, 77.594476°W; Figure 2) had permanent water and grasslands because of a subterranean spring. This was very beneficial for the herds, especially during the dry season, when the extensive marshes could have fed a large number of llamas. Although this area sustained seasonal hunting groups for millennia, the habitation sites found in association with the corrals indicate an emphasis on managing herds (Aldenderfer 2001:20). This has been well documented at the site of Ancosh Punta (PAn 5-5; 9.444341°S, 77.588239°W), about a kilometer from Llaca Amá Caca. This is a Middle Horizon pastoral site where a semi-permanent colony was established for about three hundred years (Ponte 2009b). During the Inca Horizon and the Late Intermediate Period, the agro-pastoral community of Mareniyoc may have had access to the puna ecosystem and exploited it with the same intensity as during the Middle Horizon.

Ethnohistorical Data

I have not found colonial accounts that specifically refer to the region of Mareniyoc, Jangas District, in the Callejón de Huaylas. However, there is a reference to Huaraz, fifteen kilometers south of the study area and the capital of the Ancash Region. *Mitología Andina*, based on inspection tours made by its author, Rodrigo Hernández Príncipe (1923 [*c.* 1621–1622]), includes one of the most important colonial descriptions of *ayllus* in the southern part of the Callejón de Huaylas. Hernández discovered that local populations participated in ancestral non-Christian religious ceremonies, and he attempted to eliminate any sign of these practices. Hernández amassed a great number of objects associated with indigenous religion, and burnt them in numerous villages in the region of Recuay. Hernández's account relates the social behavior of the indigenous communities, named Llacuaces, and their specific religious practices. The original place where llamas were born and roamed for the first time is consistently pointed out as the glacial lakes and springs of the Cordillera Blanca. Recuay's *ayllus* claimed to be descendants of the Thunder God, Libiac, a major deity associated with mountains and high altitudes. Elsewhere in the Andes, this god is called Illapa.The account includes information about the possible function of the *conopas* and *illas* (small talismanic objects). It describes the tradition of adoring bezoar stones or "piedras besares" (Hernández 1923:27) in hope of llama multiplication. Bezoars are solid masses of indigestible material accumulated in the stomach or intestines and found more commonly in ungulates than in people. Bezoar stones were a very popular natural medicine in the sixteenth and seventeenth centuries in Asia and Europe. Bezoars, coca leaves, and stones in the shape of llamas constituted an *illa*, which was carefully packaged with textiles to form a bundle called *enqa*. This was thought to give health and protection to animals (Flores Ochoa 1977).

Ethnographic Evidence

Although I lack details, I can affirm that very simple rites thought to promote herd increases still exist in my study area. An informant from Cuncashca, Marcelino Vergara, told me a story about magically increasing herd size using *conopas* and *illas*. This account relates to livestock of Old World origins (cattle, donkeys, sheep, and goats). Figurines need to be placed in the herdsman's temporary hut during the wet season. They must be put in a safe place within the hut, wrapped in textiles and accompanied by food and drink. The next day, the pastors count their new livestock. The concepts underlying *conopas* and *illas* includes protection, wealth, success, and human and llama reproduction. Continuity is thought to be assured by reciprocal actions of veneration. That is, Andean herders continue to make offerings to the apus, and as a result, apus give them protection and successful reproduction of the herds. (Salomon 2004). Bill Sillar (2009) proposes that these miniatures functioned as "intermediaries" between men and the mountain gods or apus.

Conclusion

There has been at least a millennium of coexistence between men and camelids in the Andes. Therefore, it is not surprising that the evidence from Mareniyoc suggests a local rite related to the reproduction of alpacas and llamas are found in the form of simple ceremonies that take place at the household level. Although the llama *illa* figurine presented in this report was found associated with Inca materials, it seems that the tradition of stone miniatures was present in the northern highland region of Peru prior to Inca times. Many kinds of miniature stone idols were venerated in the northern highlands. From Hernández's account, their relationship to fecundity rites of llamas can be deduced. The stone figurine tradition continues to the present day. Camelid figurines were replaced by ones representing cattle, but their meaning is rooted in older Andean beliefs concerning magical herd reproduction. The celebration of rites for camelid multiplication was performed in the villages, in ceremonial centers, and at work sites, that for pastoral communities, can be corrals. The miniature ceramic *illa* found in the Mareniyoc excavations most likely was related to llama reproduction during ritualized events.

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