Late Pottery of the Jácana Site (PO-29), South-Central Puerto Rico

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Abstract

Data recovery excavations of the Jácana site (PO-29) in south-central Puerto Rico yielded a rich assemblage of late pre-Columbian pottery. This article discusses the material from the Jácana-4 component, dated A.D. 1300-1500. The site in this span is interpreted as a minimally occupied location for public gatherings and ceremonies centered on a 40x50-meter batey. The vessel-based analysis of the late pottery provided detailed technological, formal, and stylistic data. The pottery attested to contributions from many potters, including those working in a non-local technological tradition. The findings are related to interpretations of the site function.

Introduction

In 2006 and 2007, New South Associates conducted Phase III data recovery investigations at site PO-29, Municipio Ponce, south-central Puerto Rico. The work was conducted for the U.S. Army Corps of Engineers (USACOE), Jacksonville District (Jacksonville District), to mitigate adverse effects related to the proposed construction of Portugués Dam and Pool Project. The project is documented in Espenshade (2011, 2012), Espenshade et al (2007), and Espenshade and Young (2008). The pottery analysis is reported in Espenshade et al (2011).

The site is a multi-component, pre-Columbian habitation complex that includes a batey (a ballcourt/dance ground/ceremonial surface), a midden mound, several areas of domestic occupation, and numerous burials. The major components were Jácana 2 (A.D. 600-900) and Jácana 4 (A.D. 1300-1500). Phase III excavations revealed that the site was larger and more complex than previously known, and also revealed the presence of a large batey with multiple petroglyphs. Recognition of the research potential and public interpretive value of the site increased as the data recovery excavations progressed, and following consultation with the Puerto Rican State Historic Preservation Office (PR-SHPO), the Puerto Rico Department of Natural and Environmental Resources (PR-DNER), and the Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico (Consejo), the USACOE decided to revise its construction plans and preserve the site (Siegel et al. 2009).

The fieldwork included a combination of geomorphological trenching (33 trenches); 71 hand-excavated units to sample the various site contexts (52 1x1-meter units, one 1.5x0.5-meter unit, and 16 0.5x0.5-meter units); machine-assisted excavation of feature exposure areas (FXs, totaling 1,790.5 square meters); exposure, analysis, and recordation of the four batey borders; the hand excavation of 49 burial features, some containing multiple individuals, and the hand excavation of 157 non-burial features.

Two major pre-Columbian components were revealed at the site, with Jácana 4 stratigraphically above Jácana 2, or mixed with the uppermost portion of the Jácana-2 deposits. In the Jácana-2 span (A.D. 600-900), the site contained numerous houses, thick midden deposits, human burials in and below the middens, a small midden mound, and possibly a batey or plaza. The thickness of the domestic midden and the frequency of burials suggests a lengthy occupation by multiple, coeval households. The associated pottery was a mix of materials fitting the expectations for late Cuevas and Early Ostionoid/Monserrate styles. The residents at the site ate a mixture of mammals (predominately hutia), fish, and shellfish, with minor contributions by birds and reptiles. There was a significant reliance on maritime faunal resources, relative to expectations for a site in the interior hills. Houses were oval forms, generally eight by six meters. It appears that the site served as a hamlet (perhaps 3-5 houses occupied coevally) and a part of a ritual landscape in Jácana 2 times.

In Jácana 4 times (circa A.D. 1300-1500), the site centered on a 40x50 meter batey, which was bordered on all four sides by rows of slabs and boulders. The north border of the batey featured a gallery of rock art, and other petroglyphs were also present in the other borders (Loubser et al. 2011). The midden mound was greatly expanded in this span, with most of the material derived from the earlier midden deposits. Only a few structures were present, and very little midden accumulated during the Jácana 4 occupation. The zooarchaeological record and the

macrobotanical remains suggest the possibility that a garden of ritual and medicinal plants was maintained at the site, and guinea pigs may have been raised there as well (Newsom et al. 2011; DuChemin et al. 2011). The Jácana 4 diet saw an increase in guinea pig, the first use of pelagic fishes, and an increased use of sea turtles. These differences relative to the Jácana 2 pattern suggest that the Jácana 4 occupation was more heavily focused on ritual consumption. This component is interpreted as a minimally occupied ceremonial center, with perhaps only a single small family present at any one time.

Defining Jácana 4

The pre-Columbian components at the site were defined on the basis of three data sets: 1) stratigraphic ordering relative to other components; 2) radiocarbon dating of contexts; and 3) internal consistency in pottery. The Jácana-4 component stratigraphically occurs above or intermixed with the uppermost portions of Jácana-2 deposits in FX-T12 and FX-F. Jácana-4 materials occur intermixed with Jácana-2 materials in the upper portions of the Midden Mound. Jácana 4 materials occur directly above but not intermixed with the Jácana-3 natural deposit upon which the batey was later constructed. The Jácana-4 component occurs overlying but not within the suspected planting mounds in FX-G. Wherever it occurs on the site, the Jácana-4 deposit is the uppermost of the prehistoric strata.

Five radiocarbon samples were internally consistent and bracket the Jácana-4 component. These calibrated, 2-sigma results from wood charcoal include: a upper Midden Mound result of A.D 1260-1310 and 1360-1390 (Beta 272031); another, upper Midden Mound result of A.D. 1320-1350 and 1390-1440 (Beta 272033); a result from an FX-F feature of A.D. 1300-1430 (Beta 272024); from prehistoric slope wash directly over the batey floor in Unit 153, a result of A.D. 1310-1360 and 1390-1440 (Beta 247736); and from similar context in Unit 153, a result of A.D. 1400-1520 and 1590-1620 (Beta 247737).

The pottery of the Jácana-4 component includes incised and punctated traits generally associated with Chicoid manifestations (Capá, Boca Chica, and Esperanza styles). These late incised or incised/punctated vessels occur only in the Jácana-4 component.

The Jácana-4 component included: light domestic midden and a possible house pattern in FX-T12; light midden, a few burials, and two possible house patterns in FX-F; a sparse midden deposit in FX-G; structural features and burials in the expanded Midden Mound; a midden deposit north of the northern border of the batey; and the 40 x 50-meter batey and its rock borders.

Results of Vessel Analysis

Figures 1-5 present examples of the Jácana-4 sample vessels. For the detailed technological, stylistic, and formal analyses, 68 Jácana-4 sample vessels were analyzed. Figures 6-10 present vessel profiles for the Jácana-4 sample. Table 1 offers a summary of the key data sets. For detailed explanations of the analytical methods and for the complete data set, the reader is referred to Espenshade et al (2011).

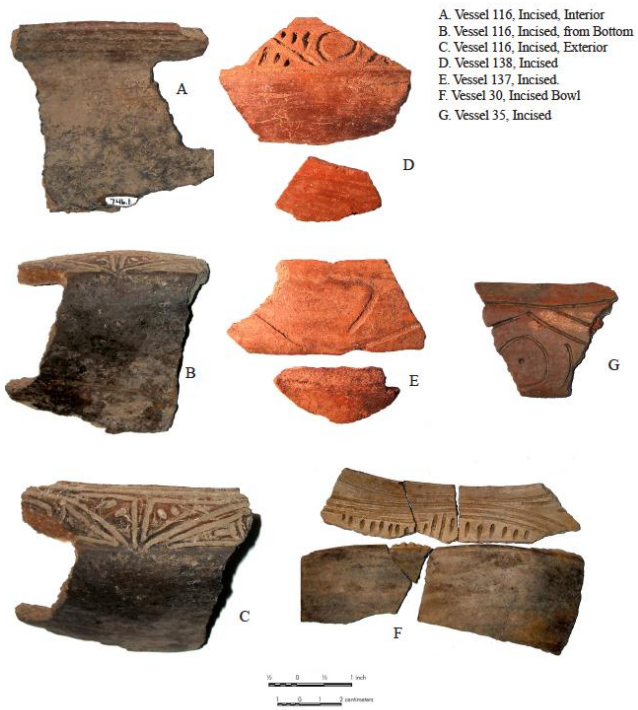

Figure 1. Jácana-4 Sample Vessels from PO-29, Jácana.

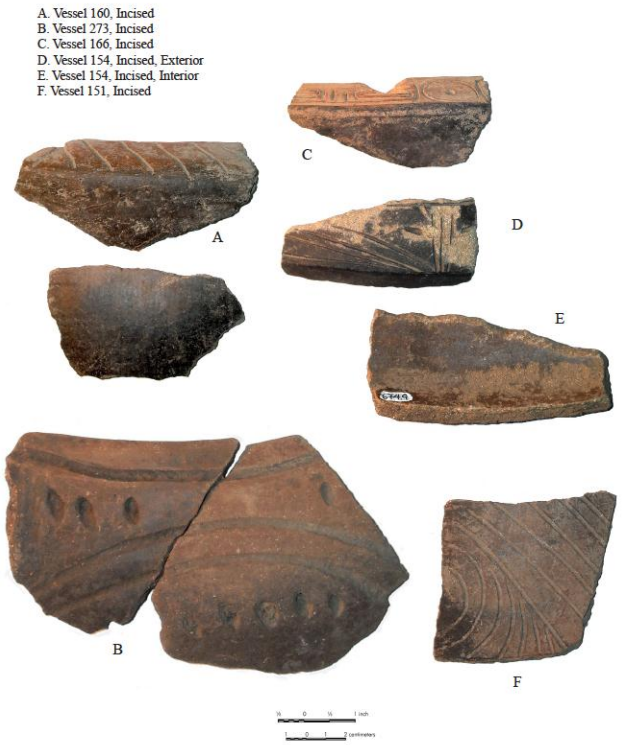

Figure 2. Jácana-4 Sample Vessels from PO-29, Jácana.

Figure 3. Jácana-4 Sample Vessels from PO-29, Jácana.

Figure 4. Jácana-4 Sample Vessels from PO-29, Jácana.

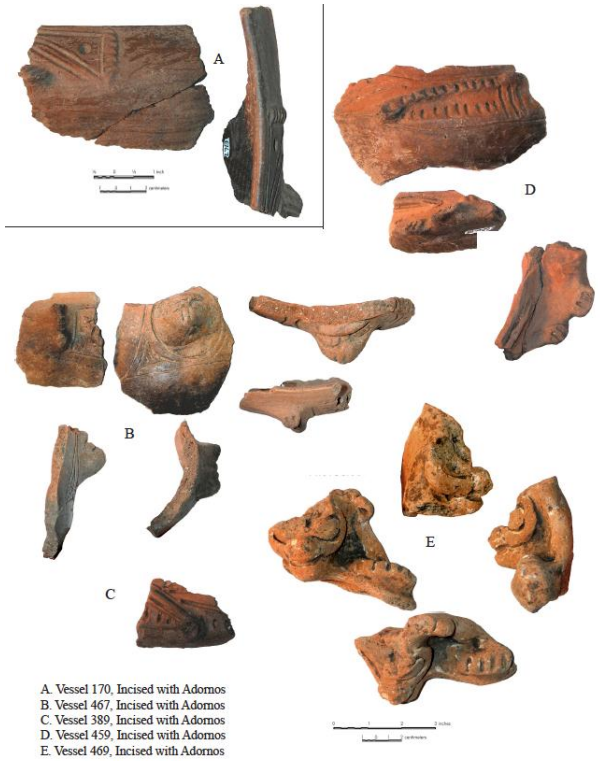

Figure 5. Jácana-4 Sample Vessels from PO-29, Jácana.

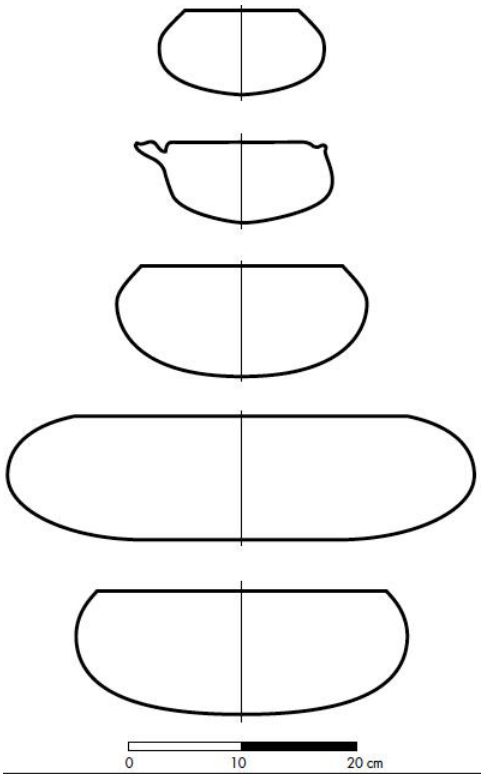

Figure 6. Vessel Form C Profiles, Jácana-4 Sample Vessels

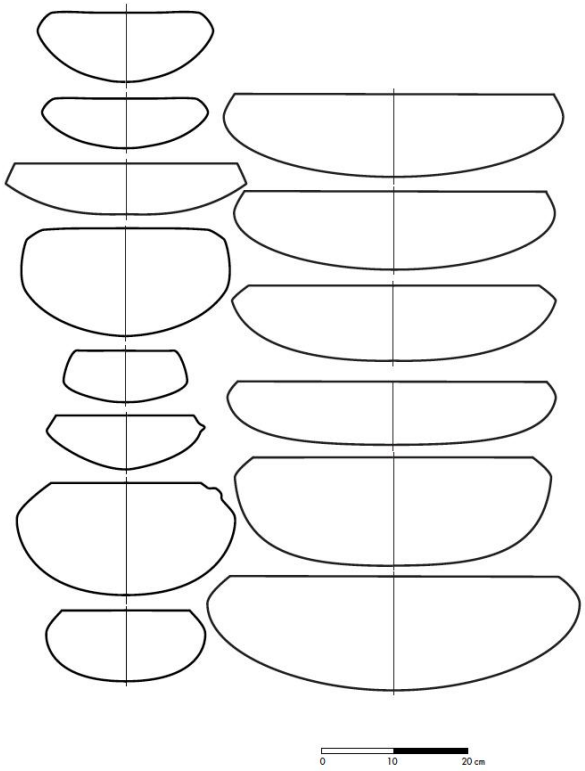

Figure 7. Vessel Form D Profiles, Jácana-4 Sample Vessels

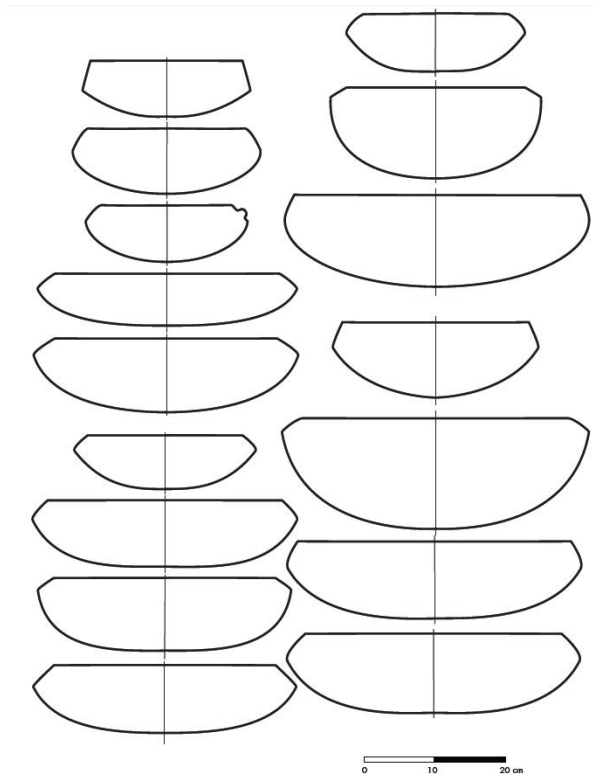

Figure 8. Additional Vessel Form D Profiles, Jácana-4 Sample Vessels

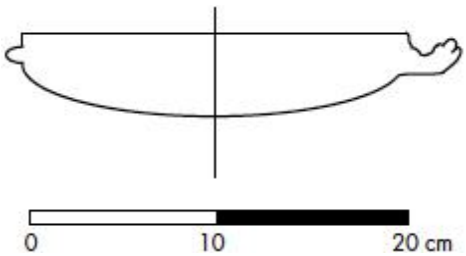

Figure 9. Vessel Form G Profile, Jácana-4 Sample Vessel

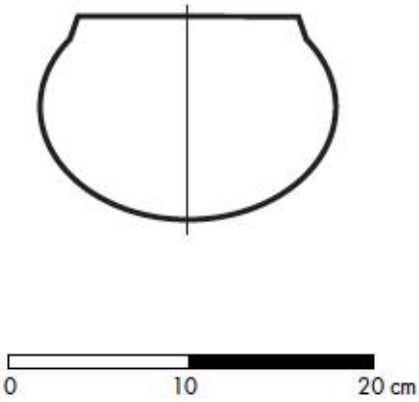

Figure 10. Vessel Form I Profile, Jácana-4 Sample Vessel

Attribute	Data
Vessels	
• Form C	7
• Form D	31
• Form G	1
• Form I	1
Shoulder Inflection	
• Count With	43 (91.5%)
• Count Without	4
Rim Forms	
• Round Direct	33
• Square Direct	13
• Interior Thickened	1
Rim Diameter	
• Range	12-42 cm
• Mean	26.4 cm
Thickness	
• Range	3.9-11.8 mm
• Mean	8.0 mm
Coil Break	
• Present or Possible	47.8%
• None	52.2%
Inferred Firing Position	
• Upright	36.8%
• Inverted	8.8%
• Indeterminate	54.4%
Core Retention	
• Range	0-100%
• Mean	42.0%
Major Paste Color	
• Dark Grey	40%
• Tan	15%
• Brown	15%
• Red	30%
Exterior Paste Colors	
• Dark Grey	29%
• Tan	21%
• Brown	2%
• Red	48%
Aplastic Type	
• White Quartz	58
• Dirty/Rusty Quartz	5
• Sandstone	1
• No Apparent Temper	1
• Metamorphic Rock	2
• Quartzite	1
Possibly Extralocal Pots	
• Including No Apparent Temper as Extralocal	6 (8.8%)
• Excluding No Apparent Temper as Extralocal	5 (7.3%)
Primary Aplastic Shape	
• No Apparent Temper	1
• Angular	56
• Sub-Angular	7
• Round	2
• Irregular	2
Aplastic Density	
• Range	0-35%
• Mean	17%
Use Abrasions	
• Present	11.8%
• Absent	88.2%
Fire Clouds	
• Present	33.8%
• Possible	7.4%
• Absent	58.8%

Table 1. Summary of Key Attributes, Jácana-4 Sample Vessels.

The Jácana-4 sample is dominated by the two simple restricted forms (Classes C and D), which account for 93.3 percent of the sample for which vessel form could be determined (excluding griddles). The Class C and Class D vessels (both varieties of simple restricted bowls) are the form most commonly associated with late components on Puerto Rico. The collection lacks other late forms that are known predominately from sites in the Dominican Republic including bottles, effigy jars, compound vessels, and design-painted platters (e.g., Cusick 1991; Bercht et al. 1997; Roe 1998; García Arévalo 1977, 1991; Beeker et al. 2002; Scott 1985). Although boat-shaped vessels are reported in certain Chicoid sites (e.g. DeBooy 1915; Cusick 1991), there were no definite boat-shaped vessels in the Jácana-4 sample.

For the vast majority of the Jácana-4 pots, a clay source similar to Maraguez clay loam was used. Outcrops of Maraguez clay occur upslope of the site. This clay had natural inclusions of fine-medium angular quartz, with the occasional presence of coarse or very coarse angular quartz. This clay was generally used without the admixture of any temper. The clay

was well kneaded, as the natural aplastics are evenly distributed throughout the vessel.

Coil breaks were recorded in approximately one-half of the Jácana-4 vessels, suggesting that most were produced through coil construction. The vessels were, on average thicker than their earlier counterparts, but there was significant overlap in the thickness ranges. Exterior and interior surfaces were most commonly smoothed.

Rims were finished rather simply. Generally, the last coil was simply pinched and smoothed into a direct round or direct square form. There were no handles documented for this component.

Site contexts and the technological similarity of Jácana-2 and Jácana-4 assemblages preclude determination of how many Jácana-4 vessels were decorated beyond smoothing or burnishing. That is, the undecorated vessels from mixed Jácana-2 and Jácana-4 could not be assigned definitively to either component. Smoothing or burnishing would have occurred when the pots were in the leather-hard state. This would also have been the time when adornos were added and motifs were created by incising and punctating. The clean welds of adornos to the outer vessel walls, and the lack of raised rims around the punctates and incisions suggest that the pots were again smoothed, semi-burnished, or burnished after the decorations were complete.

The entire neck (shoulder to rim) was generally used as a field for decoration. Whether the pot had a soft, gradual inflection or a well-defined line of inflection (i.e., a carina), the decoration was limited to the neck (i.e., the portion above the inflection).

There are a few examples of Jácana-4 adornos with red or white slip or paint. Generally, paint does not seem to have been used in overall, neck-delimited, or rim-delimited modes. Instead, it use appears to have been limited to highlighting portions of three-dimensional adornos.

After drying for several days or weeks, the pots would have been ready for firing. Drying is a crucial step in the production process as unfired pots are at risk of damage from impact or water (unless carefully stored inside a water-tight structure). It is likely that the Jácana-4 potters scheduled their pottery-making efforts to avoid seasonal periods of heavy or persistent rain. Such rain would also dampen the ground upon which firing would occur and moisten fuels. Dryer seasons would have been preferred for making and firing pots.

Based on core retention percentage and paste color data, the Jácana-4 potters fired their pots slightly better (probably slightly longer) than earlier potters. The core configuration data suggest that the pots were most commonly fired in the upright position, but other positions were also used. About a third of the sample had dark grey for their exterior color (this was high relative to the Jácana-2 sample). This may reflect a decreased concern with achieving red pots, and may also suggest some smothering of the fire late in firing process. Overall, it appears that the pots were fired in the 650-800° C range, with reasonably good air flow.

The rate of occurrence of use wear can be misleading when sample vessels on average represent only five percent of their parent vessels. The portions of pots most likely to exhibit use wear may not be present in the sample vessel. Hence, the frequency of use wear in sample vessels is considered an underestimate of the actual occurrence rate on the use assemblage. The Jácana-4 pots had use wear on 11.8 percent of the sample. Beyond the raw frequency of use wear, the degree of use wear was also high for the Jácana-4 sample. Some of the pots had a band of light-moderate, interior damage that is consistent with stirring during the preparation or cooking of foodstuffs (similar damage was seen in the Jácana-2 assemblage). However, several of the large, incised bowls of the Jácana-4 sample show much more severe interior damage, consistent with grinding or pecking of hard materials. This heavy damage is also similar to that caused by the production or storage of alcoholic beverages (Arthur 2002), but it is generally assumed that manioc beer was not used by the Taíno on Puerto Rico (cf. Veloz Maggiolo 1997).

The severe use wear on large, intricately decorated, Jácana-4 pots may be indicative of ritually-charged grinding. These bowls may have been used in the preparation of materials during public gatherings. As Mills (2007), Blitz (1993), and Schiffer and Miller (1999) argue, pots used in supra-family, public performances tend to be larger and more elaborately decorated than everyday domestic pottery.

In his discussion of Taíno cosmology, Oliver (1997) touches on two processes that may have involved ritually-charged grinding. The first is endocannibalism, "a ceremony during which the

powerful spiritual essence of a deceased person is passed along to the living in a beverage made with his or her ground and burned bones, which all the participants drink" (Oliver 1997:149). However, there is not yet any direct archaeological evidence for such a practice in Puerto Rico (José Oliver, personal communication 2010). It may be that the parching and grinding of bones was performed in the heavily worn vessels of Jácana-4. One could imagine that the preparation (i.e., not just the consumption) of the drink was part of a public ritual. It is clear from other contexts that clay pots were considered an appropriate vessel for the storage or transport of human remains. As an example, Hatt (1924) recovered an incised bowl containing an infant skeleton from the batey area at Salt River (see also Faber Morse 1997:40-41).

The other possible instance of ritually-charged grinding is the preparation of cohoba. To prepare the powder for inhalation, it was necessary to crush and grind the seeds, and to combine them with ground limestone or burnt shells. Cohoba is described as "the centerpiece of a religious ceremony crucial to the Taíno" (Oliver 1997:151). The constricted vessel forms may have served well to contain the vital powder during preparation.

Five of the 22 samples that were submitted for analysis of absorbed residues can be attributed to the Jácana-4 component (Espenshade et al. 2011). These included two griddles and three bowls. One of the griddles yielded primarily plant/fish residues, with meat also present. The second griddle evidenced plant resources but with heavy meat contribution. The second griddle also had possible pine resin.

A large pot with an effigy adorno had residues consistent with primarily plant resources (possibly including panicoid grass), with some meat. A small effigy bowl had plant/fish residues, again with some meat. Lastly, an incised bowl with heavy use wear on the interior base yielded signatures indicative of primarily plant /fish, with some meat.

Although the residue analysis sample is small, the findings are still valuable. First, as seen also for the Jácana-2 griddles, the Jácana-4 griddles were not exclusively used for plant-derived foods.

Second, the pots (including two of the most ornately decorated of the Jácana-4 vessels) seem to have been used to prepare a variety of plant, fish, and meat resources. There was no evidence that these pots saw resource-limited (or focused) use in ceremonies. There is no evidence, for example, that a pot was specially made and used only for the cooking or serving of guinea pig meat. Instead, the residue signatures are what might be expected from domestic use, and there is not a significant difference from the residues seen in the Jácana-2 sample.

Finally, the possible presence of pine resin on one of the griddles may indicate the griddle's use in the preparation or use of pine resin, possibly as incense or adhesive. Overall, six of the 22 vessels (four from Jácana-2 contexts, one from Jácana-4 contexts, and one from mixed contexts) from all site contexts yielded a signature for pine resin. The possibility is raised of long-distance trade in pine resin/copal, as there are no records of pines on Puerto Rico at the time of first European contact.

Style Issues

Through the course of this analysis, the umbrella designation "Late Incised-General" or "Jácana -4 pottery" has been used instead of the specific styles defined by Rouse; Capá, Esperanza, and Boca Chica. This lumping was intentional, as nobody understands what the Rouse styles mean (in cultural terms), and many question the validity of the Rouse styles (see Gutiérrez Ortiz 2007a, 2007b, 2010; Gutiérrez Ortiz and Rodríguez Lopez 2009; Rodríguez Lopez 2008 on Rouse style issues). The modes presented by Rouse for these three styles are not mutually exclusive, and there are very few (if any) pure late components. That is, the vast majority of late sites examined on Puerto Rico contains two or three of these styles. If one were to follow the equation of each style equals a distinct cultural entity, then there would have to have been an incredible level of long-distance trade or movement of people with their pots to account for the mixed assemblages.

The muddled nature of the style definitions, as discussed below, has forced researchers to choose one attribute over another, with no objective basis for ranking which attribute is most important. As an example, Meléndez Maíz (2001) chose to define much of the material from Palo Hincado as Capá, based on the intricacy and relatively tight packing of the incisions. This was a reasonable choice, but the incisions are broad and shallow, a trait that could be used to argue for a Boca Chica designation. Also, one

of the sherds has a line that seems to end in a punctate, a trait that could argue for either Boca Chica or Esperanza. This example is not meant to criticize Meléndez Maíz (2001), but rather to underline that the Rouse definitions for Boca Chica, Esperanza, and Capá are not mutually exclusive, and that regional archaeologists have been forced to make decisions without the objective data to do so.

In another example, the preliminary study of the site Bateyes de Trujillo Alto by Rodríguez López (1995) characterizes the late component as being predominately Esperanza, with lesser amounts of Capá. Certain of the sherds illustrated have complex motifs, which may be the reason for the Capá designation. However, these complex motifs include lines that end in punctates, a trait most commonly associated with Boca Chica. Again, the researcher had to decide to which attribute to give priority. The observed problem is not a weakness with the analysis of Rodríguez López (1995), but rather an inherent weakness in the style definitions offered by Rouse (1952).

Table 2 presents the major traits of the three styles, as defined by Rouse (1952). The quotes in the table are directly from that source. It is appropriate to review each attribute to see what Rouses uses to distinguish the three from each other.

Attribute Style	Boca Chica	Esperanza	Capá
General Quality	Well-made. Carefully smoothed surfaces	Intermediate.	"crude." Soft paste, with much sand. Sand-paper surfaces
Thickness	Mean = 8 millimeters	Mean = 7 millimeters	Mean = 7 millimeters
Shape	"Lacking in grace"	"Nondescript." More rounded than Capá	Delicate. Flat, angular.
Vessel Forms	Hemispherical bowls, jar. Spherical bottles. Necks present.	Hemispherical bowls. No necks. Rarely boat-shaped vessels.	Hemispherical bowls. Limited boat-shaped. No necks.
Adornos	"Elaborately incised and punctated"	Incised and punctated.	Incised and punctated. Pig-snouted animal is common.
Rims	"Tapered . . . lips rounded upwards or inwards."	"Tapered , , rounded either inwards or upwards" Taper not as strong as in Capá	Rounded, interior thickened.
Incised Designs	Complex. Full shoulder. Bracketed circles. Horizontal, vertical, or oblique parallel lines.	"Simpler." Two parallel lines diagnostic. Full shoulder.	Intricate. "Otherwise, they resemble the Boca Chica incised designs in all essential details."
Incised Lines	Broad lines. Often end in punctates.	Relatively broad, widely spaced. Very rarely end in punctates.	Narrow lines, tightly packed.
Painting	Very rare. Overall red.	Rare. Red. Overall, outside only, or shoulder only.	None.

Table 2. Traits of Boca Chica, Esperanza, and Capá Styles, per Rouse (1952).

The general quality of the three styles may be heavily influenced by both local clay resources and post-depositional processes. One of the difficulties with the original definition of styles was that Rouse tended to focus on sherds (rather than vessels) from what he considered "pure" or single-component sites. Given the different heartlands (i.e., areas of purest expression) of these styles, it is not surprising that there were differences in the general quality. Rouse did not include in his style samples materials from outside the heartlands. In other words, he did not include the Capá and Esperanza sherds from the Boca Chica-dominated sites of south-central Puerto Rico. Only by looking at the styles across the entire island (rather than in the location of their purest expression) can we begin to understand the possible influences of ceramic ecology on these styles. A ceramic ecological approach would force us to consider the spatial variability across the island in clays, natural inclusions, and locally available aplastics.

Thickness is problematic for three reasons: 1) Rouse (1952) does not say where on the vessel thickness was measured; 2) Rouse apparently did not measure in a consistent location on the vessel; and 3) only the means are presented, not the ranges. It is very likely that there is significant overlap in the thickness ranges for the three styles. Perhaps if an archaeologist were comparing single-style components from several sites, thickness might support the style designations. However, on a sherd or vessel analysis for a site containing multiple styles, thickness will not allow sorting to style.

The shape category would seem to represent a general spectrum of subjective evaluation. Terms such as "lacking in grace" and "nondescript" do not really provide a means to sort sherds or vessels.

Vessel form has some potential for defining styles, but only in certain cases. Hemispherical bowls are prevalent in all three styles. Bottles seem limited to the Boca Chica style, but this form is very uncommon in Puerto Rico. The presence of necked forms in Boca Chica may be a distinguishing trait, but obviously will only have utility when trying to assign a necked sherd to a style.

The only aspect of adornos that might allow sorting is the subjective observation that Boca Chica adornos are more complex than those of Esperanza or Capá. A review of the examples illustrated by Rouse (1952:Plates 5-7) finds that there is not any objective difference in the complexity of the adornos from the three styles.

Despite Rouse's claim the rim form is diagnostic, and despite his use of different terms, it is clear from the illustrations that all three styles feature a rim form that is tapered, with a small, rounded lip rolled to the interior. It is also clear that other examples from these styles lack the supposedly diagnostic rim.

The incised designs may allow for a separation of Esperanza from the other two styles, but Boca Chica and Capá are not separable based on this attribute.

Incised line width and spacing may be one area that would allow sorting. However, Rouse (1952) acknowledges that the differences in incising seen between Boca Chica and Capá are due in large part to the widths of the shoulder. It is unclear if incising on a narrow-shouldered Boca Chica would be distinct from incising on a broad-shouldered example of Capá pottery. Furthermore, Rouse provides no metrics regarding what may constitute fine, medium, and broad line widths. Figure 1-G presents Vessel 35 from our analysis, illustrating the difficulty with the attributes of line width and spacing in assigning style. This vessel has fine lines but very wide spacing. The fine lines would suggest Capá, but the wide spacing would indicate Boca Chica.

The ending of incised lines in punctates is often considered a diagnostic trait of the Boca Chica style. However, it also occurs occasionally in the Esperanza style. Such a treatment has not been documented for the Capá style, but Rouse (1952) examined only a limited sample for this series.

Painting is very rare to absent in all three styles. Especially on multi-component sites, the presence/absence of painting will not allow objective sorting.

The reconsideration of the style attributes questions the potential to sort sherds or vessels to Boca Chica, Capá, or Esperanza. Our entire sample of Late Incised-General vessels is illustrated in drawings and photographs (Espenshade et al. 2011:Appendix B). If other researchers feel they can objectively sort these into styles, they have the information necessary. The present analyst argues that many of the supposedly style-specific traits are simply the relic of taking snap-shots of materials from a very few sites and then broadly applying that information over vast areas of the island. Many of the attributes considered important in defining the

styles are closely linked to either the local ceramic ecology (e.g., the natural inclusions of localized clay resources) or the motor habits of specific potters or enclaves of potters (i.e., learning groups). Other attributes (e.g., vessel forms) may also be linked to site function, with certain forms only found in ceremonial contexts or specific resource procurement areas (Torres 2010).

With the above caveats, an attempt was nonetheless made to sort the Jácana-4 vessels into styles. Table 3 presents the tentative assignments and the bases for those assignments. Because of ambiguous cases, the relative frequency of the styles in the sample must be presented as ranges from minimum and maximum.

Tentative Style	Basis for Assignment	Vessel Numbers
Boca Chica	Presence of neck	367
Boca Chica	Incised line ends in punctuation	9, 362, 394, and 399
Boca Chica	Broad lines, widely spaced, complex motif	32, 33, 34, 116, 123, 153, 162, 166, 170, 173, 197, 200, 272, 281, 294, 301, 386, 387, 388, 389, 391, 397, 415, 428, 443, 459
Esperanza	Broad lines, simple motif	7, 8, 10, 137, 160, 191, 273, 308, 407, 414, 424
Capá	Narrow lines, tightly packed, complex motif	140, 154
Boca Chica or Esperanza	Broad lines, moderate complexity motif	304, 312, 371, 417
Boca Chica or Capá	Line width or spacing ambiguous, complex motif	30, 35, 138, 151, 174, 363, 400, 455, 467

Table 3. Tentative Style Assignments, Jácana 4 Vessels.

These data indicate Boca Chica (31-43 vessels) is the prevalent style, with Esperanza (11-15 vessels) and Capá (2-11 vessels) less well represented.

The A.D. 1300-1500 span for the Jácana-4 component is consistent with other dates from Puerto Rico (e.g., Rodríguez Ramos 2010:Figure 7.1 and Figure 8.1; Rodríguez López and Rivera 1981; Rivera and Rodríguez López 1991; Rodríguez López 1995). By A.D. 1300, Capá, Esperanza, and Boca Chica styles were all present in Puerto Rico. On certain sites, earlier styles seem to have continued post-A.D. 1300, but the Late Incised-general materials dominate numerically. At smaller ceremonial/residential sites downriver, Torres (2012) found predominately burnished sherds from this period, with very few incised examples.

Intrasite Variation

One of the issues regarding the Midden Mound was whether or not it served as a special function area during the Jácana-2 and/or Jácana-4 times. One distinguishing attribute of the Midden Mound is that it was the only site context to yield incised burens. All six examples in the vessel sample were from mixed Jácana-2/4 contexts in the Midden Mound. None were recovered from pure Jácana-2 contexts anywhere on the site. It will be recalled that the midden mound lacked a pure Jácana-4 deposit; all the Jácana-4 material was mixed into the Jácana-2 midden that formed the bulk of the mound. The contextual data lean toward these incised burens being of Jácana-4 origin.

The decoration of the buren is also consistent with a Jácana-4 affiliation (Table 4). Incising is most common in the Jácana-4 stylistic palate, and Sample Vessels 9 and 12 have incisions ending in punctuates, a treatment considered indicative of the Boca Chica style. Sample Vessel 7 varies from the typical buren in its small size, having a diameter of only 12 centimeters (reviewer Dr. Joshua Torres feels that this small item may be a Cohoba tray instead). Sample Vessel 12 has a design possibly representing an owl, a class of birds of significance to Taino beliefs (García Arévalo 1997) . The decoration of all six burens, and the diminutive size of Sample Vessel 7 suggest that these burens were used in public ceremony rather than everyday, domestic activities. It is generally the case that items used in public display are more heavily decorated than those used in domestic contexts (Schiffer and Miller 1999; Mills 2007; Budden and Sofaer 2009). The presence of incised burens only in

the Midden Mound, and their likely Jácana-4 affiliation are consistent with the midden mound having served special ritual functions during batey-related events.

Sample Vessel	Description
3	Upper surface decorated with incised line and punctuates. The design is similar to variations of the Late Incised wave motif.
7	12 centimeters diameter. Upper face incised with two lines paralleling outer edge. Upper, exterior edge is also incised with a single line below and parallel to the rim.
8	Single incised line on upper face, apparently parallel to outer edge.
9	Two incised lines on upper face, approximately parallel to outer edge. One line ends in a punctate.
10	40 centimeters diameter. Upper face incised with two lines parallel to outer edge.
12	Upper face decorated with incisions and two punctuates, in a design suggestive of an owl. One of the lines ends in a punctate.

Table 4. Incised Burens from Vessel Sample.

A review of the motifs on Jácana-4 pots and the processes of their execution suggest that there was a common template of design ideas, but a great flexibility in how those were depicted. The variability in design elements within motifs suggests the work of many distinct potters in the Jácana 4 component.

The motifs on most of the Late Incised vessels have been interpreted as variations of the latitudinal wave motif (Figure 11). In this motif, continuous or broken lines depict the regular up and down cycling of a wave (similar to a mathematical sine wave). Lower nodes are defined as the elements that occur below the wave, and upper nodes occur above the wave. Borders are either latitudinal incised lines or rows of punctuates that delimit the top or bottom of the design field. Significant variation was seen in the potter-level interpretation of this basic motif on our subsample of 49 vessels (Table 5). There was much variation in basic decisions, such as how to delimit the motif border. There was significant potter-to-potter flexibility in which elements were used to create overall motif. Even if one ignores the diversity of motor behaviors and tools evidenced in the assemblage, the actual interpretation and construction of this basic motif show the variability expected from many different potters.

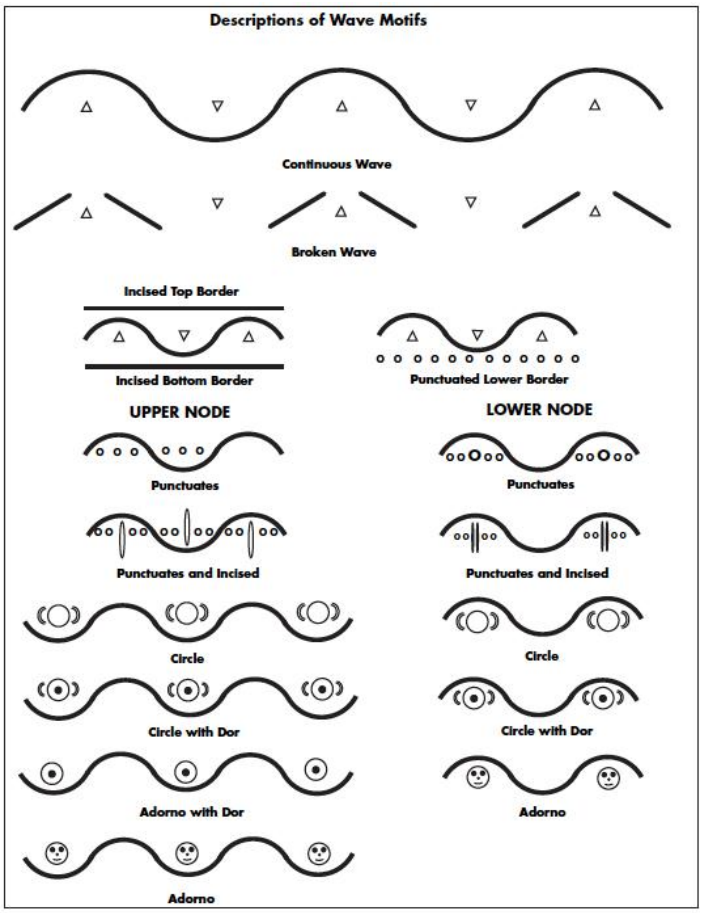

Figure 11. Terms for Describing Wave Motifs (from Espenshade et al. 2011).

Mode	State	Count
Wave Structure	Continuous	17
	Broken	27
	Unknown	5
Lower Node	Punctates	16
	Punctates and Incising	2
	None (Herringbone)	2
	Incised	3
	Incised Circle with Center Dot	8
	Incised Circle	2
	3-Dimensional Adorno	5
	Triangle	1
	Unknown	10
Upper Node	Punctates	16
	Hemispherical Adorno with Circle and Dot/Punctate	1
	3-Dimensional Adorno	4
	None (Herringbone)	1
	Incised	2
	Triangle	1
	Punctate and Incised	3
	Incised Circle with Center Dot	2
	Incised Circle	4
	Unknown	15
Lower Border	None	28
	Incised	8
	Punctates	1
Upper Border	None	9
	Incised	36
	Punctates	0
	Unknown	4

Table 5. Mode Variation in 49 Examples of Wave Motif.

Even the casual review of the examples in Figures 1-5 reveals significant variation in the execution of the wave motif. Espenshade et al. (2011:Appendix B) present full-size drawings of all the Late Incised sample vessels, and these drawings document much variability in the width of incisions, the size and shape of punctates, and the precision (i.e., uniformity in line size and spacing) of the design.

It is important at this juncture to remember that the motifs are not random geometric doodles, rather they incorporated symbols of cultural relevance to the potters and the users of the pots (Cusick 1991; Oliver 1997, 2005, 2009; Roe 1993, 1997, 1998, 2005; Godo 2005; Beeker et al. 2002; García Goyco 2009). The open circles may represent eyes, navel-less bellies of the dead, breasts, generally females, or *fosfenos* (eye spots experienced in altered states). The dot-center eye may represent bellies of the living, eyes, breasts, fertility/life, and females. The generally vertical incisions may represent bones, the dead, the ancestors, penises, and males. Where the incisions are replaced by punctuated or pierced appliqués, these seem to represent the spine, associated with both the dead and the cohoba ceremonies. The waves tying the design together may represent sea waves, the cycling of day and night, or the opposition of the living and non-living. A whole bowl from Manantial de la Aleta (Dominican Republic) has a wave design with 13 circles (11 open and 2 with dots), and Beeker et al. (2002:17) suggest that the motif may represent a lunar calendar of 13 months of 28 days each. Many researchers have addressed how Taino material culture was permeated with symbolism linked to mythology/cosmology (e.g., Oliver 1997, 2005, and 2009; Roe 1993, 1997, and 1998) .

Given the importance of the symbols, it is reasonable to suspect that a given potter would have had a well-defined motif menu for presenting the information on a vessel. However, as Figures 1-5 illustrate, the Jácana-4 pots show much diversity. There is notable range in the following: line size and spacing; the number of parallel lines in a design; the presence/absence of a continuous line at the top of the design field; the presence/absence of a continuous line or continuous row of punctuates at the bottom of the design field; curvilinear, rectilinear, or combination; presence/absence of anthromorphic or zoomorphic appliqués; presence/absence of line-end punctuates; and care of execution (as reflected in consistency in spacing, alignment, size and incisions or punctuates).

In studies of pre-Columbian pottery, it is often difficult to estimate the number of individual potters who contributed to an assemblage. Individual style may vary for a number of reasons, and the style of a given potter may shift through time. However, it is argued here that generalized statements (i.e., many or very few potters contributed to a given assemblage) can be supported by considering the specific motifs, specific motor behaviors, and specific tools evidenced in a collection (*sensu* Hill 1977, 1985; Graves 1985; Hegmon 1995). The project ceramicist has noted that first impressions of an assemblage are typically supported by metric and design analyses completed later. An experienced ceramicist can infer generally if the work at hand is the product of a few or many potters (e.g, Espenshade and Kennedy 2002; Espenshade 2001). For the Jácana-4 assemblage, a high diversity in motifs and execution was noted in the field and confirmed in the analysis.

The above discussion has focused on the variability in the wave design. It should be noted that there were additional Jácana-4 vessels, which had motifs that did not fit the classic wave (Figure 12). When these are considered, the already diverse assemblage becomes even more stylistically heterogeneous. These additional, non-wave vessels further support a case for many potters having contributed to the assemblage.

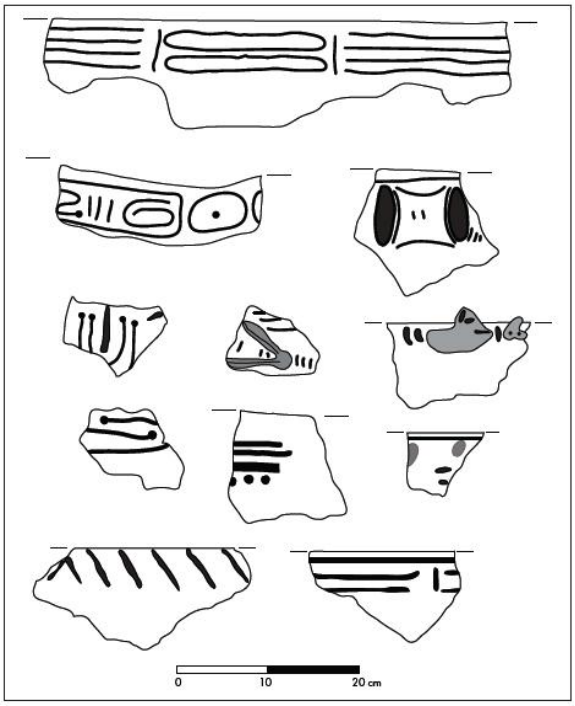

Figure 12. Non-wave Motifs, Late Incised Vessels.

The diversity seen in decoration also applies to the vessels themselves. The Jácana-4 assemblage lacks consistency in dimensional attributes. This can be seen in the size grades, in the relationship of thickness to vessel diameter, and in the relationship of neck height to rim diameter. In non-wheel pottery making, each potter has a mental template of what a small, medium, large, and very large pot measures. These size grades are generally related to the intended function(s) of the pot to be made. Each potter has a sense of the proper (in their mind) relationship of neck width to the overall vessel. Each potter has a distinct skill level that patterns thickness and rim diameter. If only a few potters are working within a given community, relatively high levels of consistency are expected in the attributes of vessels. This would be true, even if multiple generations of potters are present, given teaching regimes in primitive pottery-making.

Figure 13 shows the rim diameter data for the Late Incised pots. The 42 examples show an almost continuous distribution from 10 to 44 centimeters. There is no significant clustering of these data into well defined, potter-specific size classes. The rim diameter data suggest that many potters contributed to this assemblage.

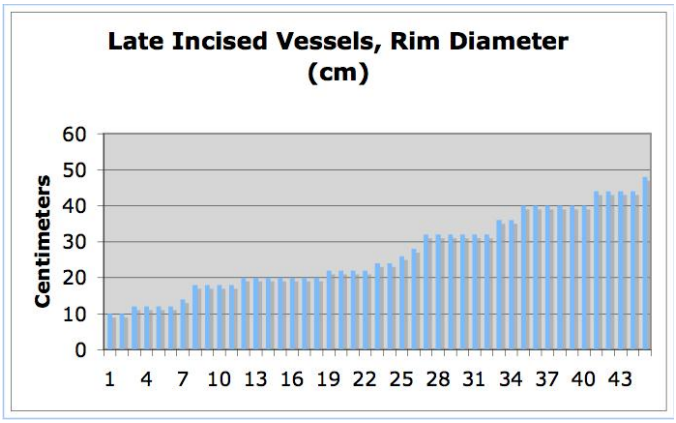

Figure 13. Rim Diameters, Late Incised Pots. Note each vertical bar is a distinct pot.

Figure 14 illustrates the relationship of rim diameter and thickness. If a single potter (or several potters from a single teaching enclave) was responsible for these pots, you would expect to see a well-defined, straight-line relationship between these attributes. In other words, thickness would be

expected to increase with rim diameter. However, the Late Incised data shows a wide scatter for the 38 pots that yielded measurements for both attributes. Multiple potters are indicated

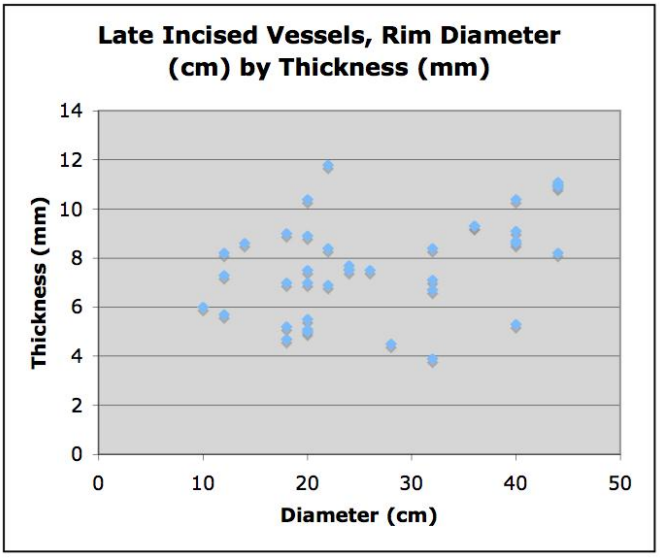

Figure 14. Late Incised Vessels, Rim Diameter (cm) by Thickness (mm).

Figure 15 plots the relationship of neck width (distance from shoulder to rim) and rim diameter for Late Incised vessels that yielded both measurements. These data are a means of addressing consistency in proportionality. How wide a neck did the potter(s) feel was appropriate for a pot of a given size? A linear relationship is expected if a few potters from a single learning enclave produced the pots. The figure shows that there is not a consistent relationship between these attributes, indicating that there are multiple potters, each with their own idea on how the two attributes should be linked. Looked at from another perspective, the sample pots range from having neck heights that are 5.0 percent of the rim diameter to having neck heights that are 36.0 percent of the rim diameter. Again, the data suggest multiple potters.

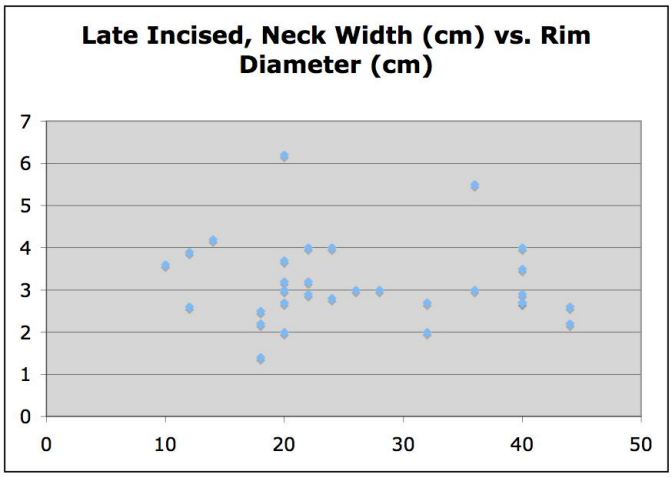

Figure 15. Late Incised Vessels, Neck Width (cm) by Rim Diameter (cm); Neck Width is Vertical Scale.

Pottery and Jácana-4 Site Function

At this juncture, it is appropriate to consolidate several lines of evidence related to the Jácana 4 material:

1. The Jácana-4 assemblage has the highest relative frequency of pots of suspected non-local origin. This suggests a late shift from highly local production to increased interaction with potters working in a different technological tradition. Vessels made in suspected non-local traditions (based on aplastic sizes and types) are more plentiful than in the Jácana-2 component, but are still a small segment of the entire Jácana-4 collection.
2. The diagnostic members of the very large vessel class are all Jacana-4. This suggests that a new vessel function (or demand) developed during the latest occupation of the site.
3. Within the members of the Jácana-4 collection, there is significant variation in the motifs. Many potters are inferred.
4. Within the members of the Jácana-4 collection, there is significant variation in the motor habits evidenced in the incised/punctuated decorations. Many potters are inferred.
5. Within the members of the Jácana-4 collection, there is much variability in the relationship of rim width and rim diameter. The work of multiple potters is suggested.
6. The 40 x 50-meter batey came into being during the Jácana-4 span.

7. Only a very few house structure patterns can be confidently assigned to the Jácana-4 component, and these do not seem to represent typical houses (Kaplan 2011).
8. There is minimal midden accumulation during the Jácana-4 occupation, especially relative to the intense domestic occupation of Jácana-2 times.

Taken together, these findings suggest batey-focused, supra-family gatherings as the driving factor in changes in the pottery deposited during the Jácana-4 span. Although the few very large vessels might be expected from feasting, there is a wide range of sizes in the Jácana-4 collection.

Renfrew (2001. See also Adler and Wilshusen 1990) developed the concept of Location of High Devotional Expression (LHDE). He argued that these locations developed among groups with essentially egalitarian societies. LHDEs are characterized as evidencing the expenditure of much labor to create facilities of little utilitarian value. The expended labor commonly is higher than would normally be expected from the population in the LHDE vicinity. LDHEs are associated with a powerful belief system, and include features, material items, and behaviors meant to engage the senses. Conspicuous consumption of food and drink is often associated with rituals at LDHEs, and pilgrimages are important. Markets may also develop in conjunction with events at LHDEs. Renfrew defines four types of economic activities at such sites: 1) the normal subsistence of permanent residents; 2) exchange economy between the residents and visitors; 3) normal subsistence by visitors/pilgrims during their time at the LHDE; and 4) sacred economy including offering of tribute, prestige offerings, and badging (exchange for souvenirs for the pilgrims to take with them). The Jácana-4 pots evidence use with many types of resources, are the products of many different potters, include possibly extralocal vessels. The Jácana-4 pots may have been deposited in a combination of Points 1 and 3 above. Point 2 is less likely, given that exchange of pots usually involves new, unused pots, and exchange of goods stored in pots might be expected to occur in a resource-specific pot. Likewise, new pots might be expected for use in bringing tribute or prestige offerings brought to a site.

The co-occurrence of three styles in the same site, and apparently produced in the local ceramic tradition is problematic. If there is a strong geographical link between style and place of location, why are all three styles being made in one location? Are potters coming as pilgrims, bringing their home decorative styles but producing pots at Jácana for use in the local ceremonies, using the local technological tradition (i.e., using near-site, untempered clays)? That might imply a greater than expected ceremonial element in the production of certain late vessels.

Another possible explanation that comes to mind is that clays similar to those used at Jácana are found over a broad area. This does not seem likely, from a review of on-line soils data.

Lastly, we have to consider that there may have been great potter-to-potter flexibility in which style she chose to make (or possibly which style the archaeologist would place a given pot into). So, there may not have been a Boca Chica area or Boca Chica people. Instead, late potters may have had the flexibility to make pots, some of which are today considered to fall into multiple styles. With a lot of potters bringing wares to the batey or making pots at or near the site, and with a high level of freedom on decorative choices, the archaeological record would look like what we see at Jácana.

In Jácana-4 times, other site attributes also fit with the presence of LHDE. The site generally lacks late, domestic midden deposits, and there are only a very few structures, possibly of special function. The large batey, 40x50 meters in plan, features a gallery of impressive petroglyphs along its northern border. The midden mound was significantly expanded during the Jácana-4 span. There is not a village or series of villages associated with this site. Espenshade (2012) has specifically identified this site not only as an LHDE, but as one element of a scared landscape.

The picture is consistent with might have resulted from routine pilgrimages to a sacred place, possibly accompanied by public festivities and feasting. The presence of apparently extra-local pottery made by many different potters, the presence of extra-local faunal resources (including marine shellfish), the presence and use of pine resin from an off-island source, the strong representation of medicinal and ceremonial plants, the presence of suspected high status foods, and the evidence for gathering and properly preparing porcupine fish are consistent with the expectations of public ceremonies rather than everyday domestic activities.

Conclusions

The data recovery excavations at site PO-29, Jácana, have yielded a rich assemblage of sample vessels from the time span A.D. 1300-1500. The technological, stylistic, and formal analysis of 68 sample vessels has provided a detailed characterization of the pottery of this component. The analysis questions the validity of distinctions between Rouse's Capá, Boca Chica, and Esperanza styles, and suggests that pottery consistent with all three styles was being produced in the local technological tradition. The late pottery of Jácana shows a high degree of variability, suggesting the work of many potters. Certain of these potters were working in a non-local tradition. The size, diversity, forms, use wear, and residues suggest that the site refuse in the Jácana-4 span accumulated from limited domestic occupation (possibly a shaman and his immediate family) and from pilgrims/sojourners attending large public ceremonies.

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