EARLY POTTERY OF THE JÁCANA SITE (PO-29), SOUTH-CENTRAL PUERTO RICO

Christopher T. Espenshade

Data recovery excavations of the Jácana site (PO-29) in south-central Puerto Rico yielded a rich assemblage of pre-Columbian pottery from the Jácana-2 component, dated A.D. 650-900. The site in this span is interpreted as a hamlet with an incipient midden mound and possibly a small batey. The vessel-based analysis of the assemblage provided detailed technological, formal, and stylistic data.

Por los excavaciones del Fase III en el sitio Jácana (PO-29), en el sur-central de Puerto Rico, hemos obtenido un collecion rico de ceramicas de la epocha pre-Columbian. En este ensayo, se consideran el material del component Jácana-2, del period C.E. 650-000. El sitio en este tiempo tenía diversos residentes, y tambien sirvió como el lugar para reuniónes y ceremonias publicas. El analysis basado en vasijas se derivaban datos technológicos formas, y estilíticos.

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 (USACE), Jacksonville District (Jacksonville District), to mitigate adverse effects related to the proposed construction of Portugués Dam and Pool Project. The Puerto Rico Department of Natural and Environmental Resources funded the investigations and owns the site. 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 late, Jácana-4 pottery from the site was potential and public interpretive value of the site increased as the data recovery excavations progressed, and following consultation with the Puerto Rico State Historic Preservation Office (PR-SHPO), the Puerto Rico Department of addressed in an earlier article in *Caribbean Connections* (Espenshade 2013).

The present paper focuses on the Jácana-2 (A.D. 650-900) pottery. 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. 650-900) 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 Natural and Environmental Resources (PR-DNER), and the Consejo para la Protección del Patrimonio Arqueológico Terrestre de Puerto Rico (Consejo), the USACE 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. 650-900), 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 2

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-2 component stratigraphically occurs below or intermixed with the basal portions of Jácana-4 deposits in FX-T12 and FX-F. Jácana-2 materials occur in the basal strata of the Midden Mound, and are intermixed with Jácana-

4 materials in the upper portions of the Midden Mound. Planting mounds in FX-G also originated in the Jácana-2 occupation.

The dating of Jácana 2 component was established through stratigraphic position and radiocarbon results. The pottery recovered from the Jácana 2 contexts was internally consistent, matched the expectations for the range established by the radiocarbon results, and lacked pottery treatments diagnostic of later periods. In FX T-12, the Jácana 2 component was a distinctive cultural deposit, separated by sterile strata from the Jácana 1 component below and the Jácana 4 component above. In FX-F, only the uppermost portion of the thick Jácana 2 midden showed the mixing with Jácana 4 artifacts. The initial core of the Midden Mound contained only Jácana 2 material, and the expansion (upper portions) of the Midden Mound had predominately Jácana 2 midden with some intrusion of Jácana 4 materials. At the Gully Top, the entire prehistoric midden was attributable to the Jácana 2 period.

The Jácana 2 component yielded six radiocarbon results in the expected range, and one that seems somewhat late. The dates falling in the expected range include (calibrated,2-sigma): a result of A.D. 650-780 from FX-T12 (Beta 272023); a second result from FX-T12, A.D. 660-810 (Beta 272028); a third result from FX-T12, A.D. 660-880 (Beta 272030); a result of A.D. 670-880 from the Midden Mound (Beta 272025);

- Two-dimensional lugs are present;
- Rim buttons are present;
- Most rims are direct round or direct square forms

and two identical results of A.D. 690-900 and 920-950 from the Gully Top (Beta 272026 and Beta 272027). The seemingly late result came from a burial in FX-12 and was A.D. 870-1010 (Beta 272029). Excluding the late date, the other six Jácana 2 dates are internally consistent, and all fall later than the result for the Jácana 1 context. The various data sets suggest a range of circa A.D. 650-900 for the Jácana 2 component.

This component is characterized by a mixture of ceramic traits generally associated with Monserrate/Early Ostionoid, Cuevas, and Modified Ostionoid manifestations. There have been a number of detailed pottery studies that have documented these general styles co-occurring (Lundberg and Wild 2006; Lundberg and Righter 1999; Lundberg 2001; Oliver 1995; St. Jean 2008a, 2008b). The spatial data and radiocarbon results at Jácana suggest that the three general styles co-occurred. The pottery was generally made of clay similar to the subsoil described as occurring upslope from the site. Such soil naturally contains fine-medium to coarse, angular quartz. Added temper was generally only found in griddles/burens. The general characteristics of the Jácana 2 pottery include:

- Loop handles are present, most commonly extending above the rim;
- D-shaped handles are present as a minority handle type;
- smoothed interior and exterior surfaces are common;
- Red or orange slip occurs rarely;

- White slip occurs very rarely;
- Red painting occurs very rarely, typically in overall application;
- Incising is very rare, occurring only on the broad, upfacing rim flat of open bowls/platters;
- Boat-shaped vessels occur with or without carinations; and
- Annular foot-rings are present as a minority base type.

Application of General Styles

Traditional Rousian analysis of Caribbean pottery has been questioned on multiple grounds, including: 1) there was not a temporally or spatially consistent trajectory of ceramic change in Puerto Rico; 2) the ceramic development in Puerto Rico was not characterized by the simple replacement of one style by another; 3) the modes used by Rouse to define styles often actually cross-cut styles, and Rouse does not say which modes he considers diagnostic; 4) the cultural changes inferred from ceramic changes are not consistent with other cultural traits such as lithics and plant diet; and 5) the temporal and spatial ranges established by Rouse underestimate the high degree of variability, and in some cases are inaccurate (Gutiérrez Ortiz 2007a, 2007b, 2010; Gutiérrez Ortiz and Rodríguez Lopez 2009; Rodríguez Lopez 2008; Rodríguez Ramos 2010). Rouse provided a valid and valuable framework for ordering Puerto Rican ceramic components, but recent work has underlined significant temporal and spatial variability within the established typology and chronology.

For the present project, the concept of general style was utilized. In defining general style, we considered only key attributes when sorting vessels. These attributes could occur only in one of our general styles, and corresponded to "quick sort" approaches used on much of the island. The purpose of assigning general styles was to address whether there were multiple, separate, ceramic-distinct components encapsulated in the Jácana-2 assemblage, or whether there were multiple general styles being made and used coevally. The general styles were also used in a cluster analysis to see if statistically defensible classes could be defined that would correspond to the general styles.

Four general styles were defined by the following attributes, as follow:

- Cuevas-general: Vessel forms A and B, D-shaped handles even with or below the rim, or annular base.
- Monserrate-general: Loop handles, rim points, or 2-dimensional lugs.
- Ostiones-general: Vessel forms G or H with an interior thickened rim, with incising on an interior thickened rim or overall red slipping on the vessel interior.
- Late Incised-general (Boca Chica, Capa, Esperanza). Complex incising on the exterior neck of restricted vessel forms, or 3-dimensional adornos.

The Late Incised-general style is found only in the Jácana-4 component, and will not be discussed in this article (see Espenshade 2013). The suffix "-general" is used to designate that these are only

general styles, used specifically to regiment the discussion of the Jácana assemblage. These are not meant to be replacements for the original style definitions, nor are they meant as formal types.

Sample Vessel Analysis

All of the non-residual sherds (i.e., those greater than 3x3 cm) were pulled for possible sorting into Sample Vessels. Surface decoration, aplastic content, general thickness, interior surface treatment, paste, and to some extent color were considered in sorting the sherds into vessels. The analysis defined 489 sample vessels. This is a small percentage of the total number of vessels represented by the sherds recovered, but provides a significant sample of sample vessels from all the major site contexts.

The term "sample vessel" is used to designate each vessel lot. The sample vessels represent the grouping of sherds based on identical attributes. It is important to remember that sample vessels are not arbitrary groupings: the sherds are grouped together as a sample vessel because their attributes are internally consistent, and because the values for those same attributes differ between sample vessels. Lacking whole or completely restorable vessel (there were only two recovered from this site), archaeologists rely on a reasonable proxy, the sample vessel. Sample Vessel, as used here, covers Bollong's (1994) Codes 1-4. It is similar to the analytical vessel concept used by St. Jean (2008a, 2008b) in her study of Early Ostionan Ostionoid pottery from El Cabo, and by Espenshade (2000) is his analysis of the vessels from PO-21.

Sample vessels do not represent absolute minimum vessels, as not all sherds could be sorted to sample vessels. Indeed, the majority of sherds were not assigned to a sample vessel. It must be recalled that sample vessel analysis makes the compromise of examining a somewhat limited number of vessel lots, but examining each in detail. That said, the sample of 489 vessels likely represents one of the most extensive and intensive ceramic studies in the Caribbean to date.

The literature on ceramic change and continuity is clear that the attributes of pottery do not all change at the same rate or along the same trajectory. Gosselain (2000), for example, has argued that decorative traditions and technological chaînes opératoires change differently, and both must be studied if we are to better understand cultural dynamics. For the present study, a broad range of technological, stylistic, and formal attributes were considered: Exterior Treatment, Second Exterior Treatment, Their Exterior Treatment, Fourth Exterior Treatment, Interior Treatment, Second Interior Treatment, Vessel Class, Shoulder/Neck Form, Base Form, Rim Form, Shoulder Inflection, Rim Diameter, Neck Diameter, Body Diameter, Base Diameter, Thickness Three Centimeters Below Rim, Coil Breaks, Rim Production Step, Core Configuration, Carbon Retention, Major Paste Hue, Major Paste Value, Major Paste Chroma, Primary Aplastic Type, Primary Aplastic Shape, Primary Aplastic Size, Aplastic Density, Secondary Aplastic, Tertiary Aplastic, Paste Class, Internal Organics, Sooting, Use Abrasions, and Fire Clouds. The full details of how each attributes are recorded are presented in Espenshade et al. (2012).

Results of Vessel Analysis

Figures 1-2 present examples of the Jácana-2 sample vessels. For the detailed technological, stylistic, and formal analyses, 71 Monserrate-general vessels, 15 Cuevas-general vessels, and six Ostiones-general vessels were examined. Figures 3-4 present vessel profiles for the Jácana-2 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-2 Sample Vessels from PO-29, Jácana.

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

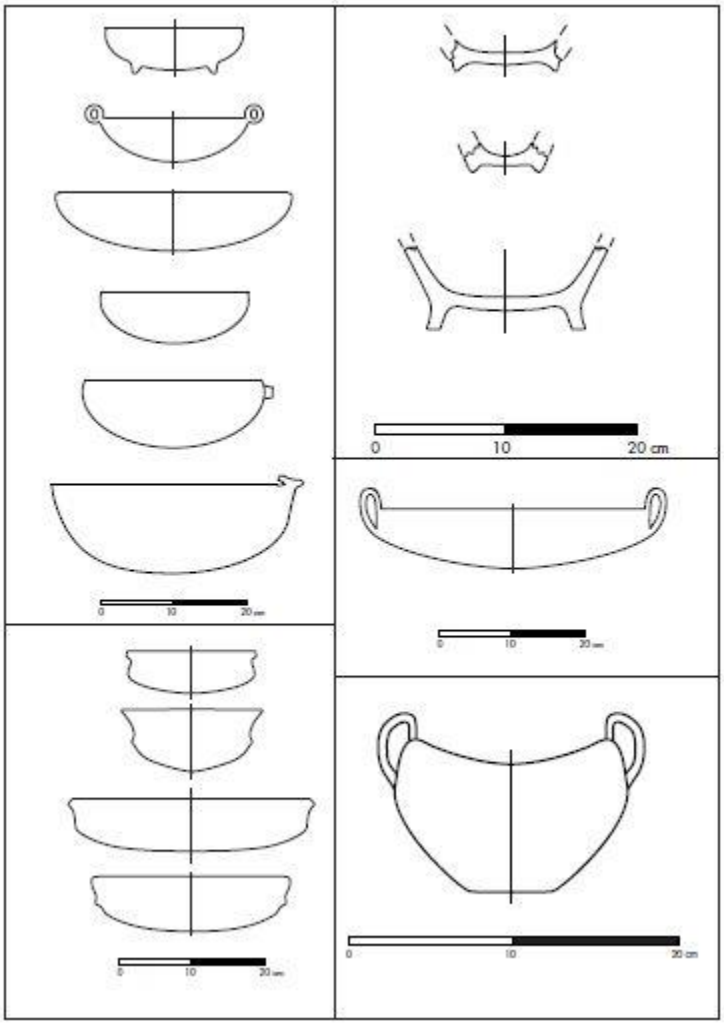

Figure 3. Jácana-2 Vessel Forms from PO-29, Jácana.

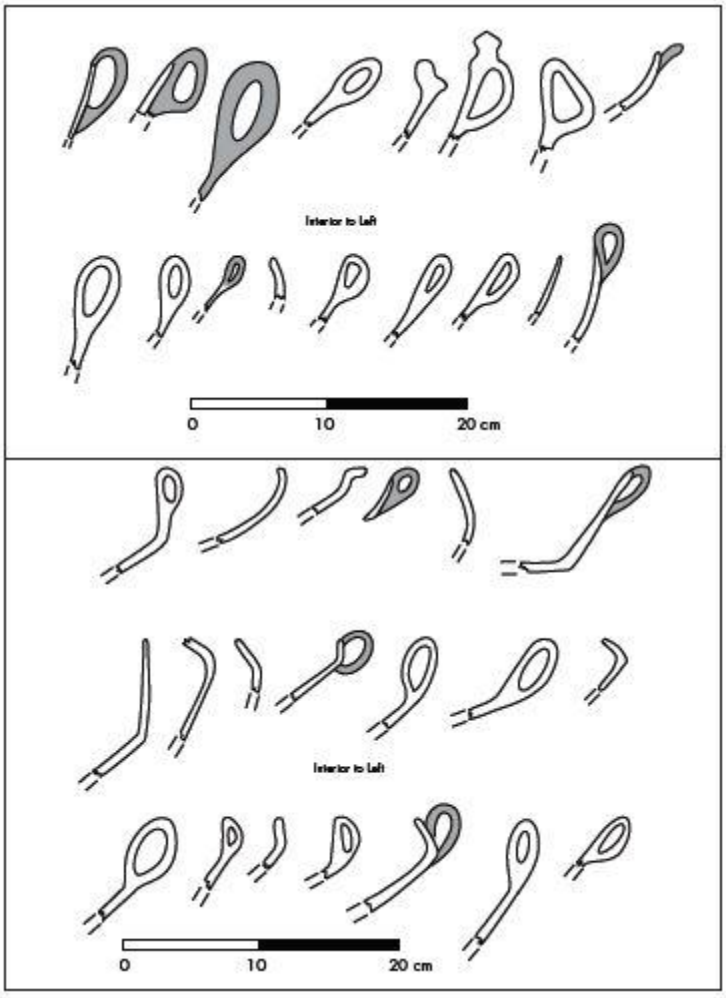

Figure 4. Jácana-2 Vessel Forms from PO-29, Jácana.

Table 1. Summary of Key Attributes, Jácana-2 Sample Vessels.

Attribute	Cuevas-General	Monserrate-General	Ostiones-General
Vessel Forms			
Form A	5	0	0
Form B	4	0	0
Form C	0	1	0
Form D	0	3	0
Form E	0	1	0
Form G	0	0	3
Form H	2	12	2
Form I	0	0	0
Form K	3	0	0
Form L	0	18	0
Form M	1	18	0
Form N	0	11	0
Shoulder Inflection			
Count With	11	29	0
Count Without	1	8	2
Rim Forms			
Round Direct	3	46	0
Square Direct	2	3	0
Interior Thickened	0	0	6
Rim Diameter			
Range	12-42	12-36	20-36
Mean	24.9	22.7	27.2
Thickness (3 cm below rim)			
Range	4.0-11.1	3.6-12.8	4.5-7.3
Mean	7.4	6.6	6.0
Coil Break			
Present or Possible	80.0%	24.6%	50.0%
None	20.0%	75.4%	50.0%
Inferred Firing Position			
Upright	80.0%	53.0%	100.0%
Inverted	0.0%	8.5%	0.0%
Indeterminate	20.0%	38.5%	0.0%
Core Retention			
Range	0-100%	0-100%	0-100%
Mean	72%	55%	41%

Major Paste Color			
Dark Grey	87%	60%	50%
Tan	13%	6%	0%
Brown	0%	2%	0%
Red	0%	32%	50%
Exterior Paste Colors			
Dark Grey	12%	9%	0%
Tan	40%	21%	0%
Brown	0%	4%	0%
Red	48%	66%	100%
Aplastic Type			
White Quartz	13	64	6
Dirty/Rusty Quartz	1	4	0
Sandstone	0	1	0
No Apparent Temper	1	2	0
Possibly Extralocal Pots			
Including No Apparent Temper as Extralocal	6.7%	5.6%	0.0%
Excluding No Apparent Temper as Extralocal	0.0%	2.8%	0.0%
Primary Aplastic Shape			
No Apparent Temper	1	2	0
Angular	13	67	6
Sub-Angular	1	1	0
Round	0	1	0
Irregular	0	0	0
Primary Aplastic Size			
No Apparent Temper	1	2	0
Fine-Medium	14	67	6
Coarse or Larger	0	2	0
Aplastic Density			
Mean	13%	13%	12%
Use Abrasions			
Present	6.7%	1.4%	0.0%
Absent	93.3%	98.6%	100.0%
Fire Clouds			
Present	33.0%	31.0%	16.7%
Possible	0.0%	4.2%	0.0%
Absent	66.7%	0.0%	83.3%

The full vessel use assemblage is not known for the Jácana 2 component. It will be recalled that there are 329 untyped sample vessels. These vessels lacked the attributes to allow objective sorting into either the Jácana 2 or Jácana 4 component. The vessel forms that are documented for the Jácana 2 collection include Classes A, B, C, D, E, F, G, H, K, L, and M. These forms entail a range of inferred functions including food processing/cooking, platter-based serving, small bowl serving or consumption, and possibly storage. The measurable examples suggest a diversity of vessel sizes from very small (12 centimeters diameter) to large (42 centimeters diameter). Griddles are present, indicating the likely cooking of manioc bread and other plant products (the residue analysis suggests that griddles may also have been used as generalized work surfaces).

As will be discussed further below, the Ostionoid-general platters of the Jácana 2 collection may have been fine wares. There may have been greater care taken in the forming, decoration, and firing of the vessels, possibly reflecting a ceremonial function. The remainder of the vessel classes suggests that diverse domestic activities were pursued at this site. The vessel assemblage is similarly diverse as the Early Ostionoid vessel assemblages from PO-21 (Espenshade 2000) and El Cabo (St. Jean 2008).

Width was measured for the 43 loop or D-shaped handles in the Jácana 2 assemblage. Handle width will vary with vessel size, and can provide a general impression of the size of vessels. Because of their plan shape, it is not accurate to directly measure rim diameter for boat-shaped or oval vessels. Handle width can also have temporal implications, as handles slowly widened through the Monserrate period, becoming extremely wide in early Elenoid times.

The handle width data shows no significant differences (Table 2). The Midden Mound has a slightly higher mean, but that high value is in part due to a single vessel with extreme (71.8 milimeters wide) handles. If the handles of this large platter were not considered, the revised mean for the midden mound would be 30.2 milimeters. The data from the Jácana 2 assemblage reflect the expected variation in size of handled vessels, from small bowls (possibly individual eating dishes) to medium cook and storage pots. The aforementioned platter from the Midden Mound was the only handled vessel whose size suggests a possible ritual/public serving function.

Table 2. Widths of Jácana 2 Loop Handles, By Site Context

Context	Measurable Handles	Range (mm)	Mean (mm)
Midden Mound	11	13.6 - 71.8	34.0
FX-F	17	18.5 - 37.4	25.6
FX-T12	4	17.7 - 32.9	26.8
Batey	6	16.4 - 49.2	31.6
Gully Top	5	22.3 - 45.5	33.8

The Jácana 2 pottery was produced using a clay source similar to Maraguez clay loam, which occurs upslope of the site. This clay naturally contains angular quartz in the fine-medium size grade, with coarse and very coarse sizes also occurring sometimes. Aplastic density is consistent throughout a vessel and there is no micro-stratigraphy visible in the paste. These facts suggest that the clay was well mixed or kneaded before use in potting.

For the production of burens, granule or pebble aplastics were sometimes added to the natural clay. Round rock, tabular rock, and grog (crushed sherds) are among the materials added. These large additions were apparently an effort to decrease the risk of damage from thermal shock. These larger items may also have helped limit cracking during the drying of the large, thick griddles.

There are a few examples of Jácana 2 pastes with no apparent temper, suggesting either use of another clay source or purposeful processing of the Maraguez-like clay. Slaking has not been documented in the Caribbean, but the method may have been used in creating clay bodies, slips, and paints. After mixing clay and water to create a thick slurry, the heaviest portions of the soil (i.e., typically the larger aplastics) will settle out first, and the finer portions will remain in suspension.

There are several sample vessels that make use of another source, one that yields kaolin-rich clay. Such clay occurs either as a white slip (e.g., Sample Vessel 19) or possibly as admixture to yield a whitish grey paste. Maíz López (2002) discusses similar vessels from the Hernández Colón site on the Cerrillos River. He reports that pure kaolins and kaolin-rich clays are known from Coastal Plain contexts in many parts of the island. St. Jean (2008a, 2008b) reports that Leiden University researchers documented cream slipping and use of white clay in Early Ostionan Ostionoid pottery from the eastern Dominican Republic.

The Jácana 2 vessels were produced through coil building. Flat-based vessels may have begun with a pancake disk to which coils were added. There were no breaks observed to suggest that the flat bases were produced through spiral coiling. Instead, it appears that the bases were flattened from a single ball of clay. The few annular bases were created by the addition of a coil around the bottom perimeter of a flat basal disk.

The coils were moderately to well melded with each other, as the vessel walls were constructed. The construction of each vessel was likely a phased process, with the lower walls needing to harden/dry slightly before the mid wall coils could be added, and so on.

The majority of the Jácana 2 pots were smoothed on the interior and exterior. This would simply have required the wiping of the surfaces with the hand or possibly with a gourd or sherd scraper. Semi-burnished and burnished surface finishes are also common, and these would have required burnishing with a hard object (e.g., rock, bone, seed) once the vessel is leather hard.

The only handling attachments in Jácana 2 times were flat lugs and true handles. The handle forms include both D-shaped handles that do not extend above the rim, and loop handles that do extend above the rim. Loop handles are by far the more popular of the two forms. Handles were used on both round

and boat-shaped vessels. Handles could not be added until the sidewalls had stiffened sufficiently to bear the weight of the handle.

The most common form of decoration after surface treatment was the modeled addition of rim points, rim buttons, and two-dimensional lugs. These seem to have occurred most frequently on boat-shaped effigy vessels.

There is very little other decoration in the Jácana 2 collection. The few examples are limited to slipped surfaces, painted surfaces, and incising on the rim flat of interior thickened rims. Both orange and red slips were noted, and these vessels were frequently burnished after slipping. Painting is uncommon in the assemblage. When present, overall red was the preferred treatment.

The incised rim flats occur on two Sample Vessels (401 and 468). For these vessels, a thin coil was added to the interior of the rim, and it was joined and smoothed to create an interior thickened, horizontal rim flat. The incising is typically a variant on the basic motif of multiple lines running parallel to the rim.

After the vessels were decorated and allowed to dry for at least several days (inferred from ethnographic studies of potters in tropical climes), they were prepared for firing. Fire clouding suggests that many of the Jácana 2 vessels were in contact with fuels during the firing. When indicators are recognizable, it appears that most vessels were fired in an upright position. The significant core retention suggests that the firing temperature or duration were limited. Because of the prevelance of red and tan exterior colors (over dark greys), firing temperature and oxygen flow do not seem to have been an issue. Instead, it is clear that the fires reached the temperatures necessary to generate color changes in the pastes (perhaps 650-700˚ C), but this temperature was not maintained sufficiently long to generate color changes throughout the entire cross-section.

Based on the data and ethnographic analogy, a possible firing regime can be reconstructed. The pots would first have been pre-heated by placing them in a circle around a small surface fire. They would be slowly turned and incrementally moved closer to the fire. After possible an hour of preheating, a donut hole would be opened in the ash/coal bed and the pots would be placed in upright positions. The coals would then slowly be pushed toward the vessels. At this juncture, a hot-burning fuel (wood, palm fronds, dried grasses) would be added, and a hot, open flame fire would be fed for possibly a half-hour. There is no evidence of a smothering fire; instead there was good airflow to the pots. At this juncture, the fire would be allowed to slowly burn down, and the pots would cool slowly. The next morning, the pots would be removed from the fire.

The data may indicate that the Jácana 2 potters were aware of the effects of air supply and heat on paste colors, and that they managed their fires to yield red surface colors on certain vessel forms, especially broad bowls and platters (Figure 5).

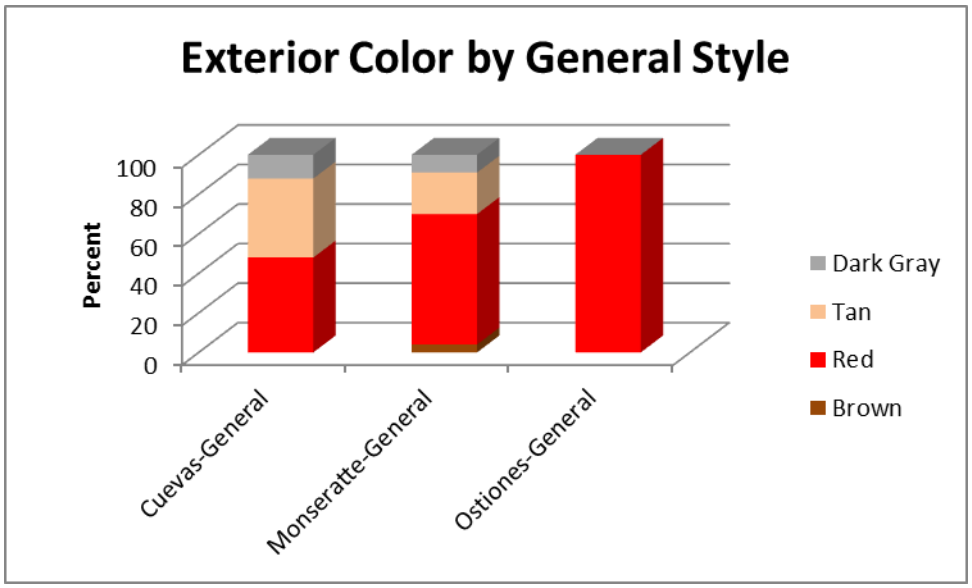

Figure 5. Exterior Colors by General Style.

The uses of vessels can be inferred, to some degree, by the size and form classes present. Limited inferences can also be drawn from the absorbed residue analysis. Fifteen of the 22 vessels subjected to absorbed residue analysis are from the Jácana 2 component. The key findings for this component include:

- Plant or plant/fish resources were prevalent in most of the sample. This signature is consistent with the "pepper pot" approach to cooking, where manioc stock and a variety of plant and fish resources were cooked and served as a stew. The signature would apply to either the vessels in which stew was cooked or served.

- Meat was also present in most of the sample. A mixed diet is suggested by the sample. It should be emphasized that many fish and meat packets were probably cooked directly over flame or coals, without benefit of a pot. The rate of fish and meat residues in the sample may provide an underestimation of the importance of such resources in the diet.

- Possible panicoid grass was present in several of the pots.

- Four pots from this component yielded a signature for pine resin. This is surprising because pines are not known from pre-Columbian Puerto Rico. This incidence of occurrence (pine residue was also present on two other pots) and the clarity and uniqueness of the signature make it unlikely that this is an issue of contamination. Notably, the signature is for pine resin, not for pine smoke, soot, or ash. The long distance trade in pre-Columbian pine resin (copal) is

well documented in Meso-America, where copal was used in ritual contexts, typically in association with hallucinogenic substances. The possibility of long distance, circum-Caribbean exchange of pine resin will need to be evaluated with data from many regional sites.

- The griddles were not simply used for plant resources. Fish and other meat signatures were derived from several of the griddles suggesting either that animal resources (fat or oil?) in the processing of plant resources or the use of the griddles as generalized "kitchen" work surfaces. It is not difficult to imagine the use of a whole or broken griddle as a convenient surface for processing animal resources.

- There was no evidence that pots were made for use with only a single resource, perhaps in conjunction with ritual. Instead, the pots seem consistent with general use, domestic items. Some may have been also used for ritual (burning of incense?).

- There was no evidence of resource differentiation, by status or site area. The elites (if any were present) were not eating a meat-heavy diet, while the others subsisted on a plant-heavy diet.

The absorbed residue results are consistent with the expectations from a domestic occupation.

Palimpsest or Coeval?

As mentioned above, one of the research avenues for the Jácana-2 assemblage was the temporal relationship of the three general styles, Cuevas-general, Monserrate-general, and Ostiones-general. By traditional chronologies, the three general styles may have represented a sequence (i.e., Cuevas > Monserrate > Ostiones). Alternately, the three could have been elements of a single ceramic tradition, with all three styles in use at the same time.

Even a simple review of the figures and tables in this article will show that there is patterning in these results. There are several points worthy of consideration here. First, Ostiones-general is the extreme case for almost every attribute examined. It is either the highest or lowest value for rim diameter, thickness, upright firing indicators, incidence of homogeneous dark cores, mean core retention, incidence of red as exterior color, percent of vessels with quartz as the major aplastic, incidence of non-angular aplastics, occurrence of non-contiguous aplastic size classes, incidence of atypical secondary or tertiary aplastics, mean aplastic density, incidence of non-grainy paste, frequency of use abrasion, and rate of fire clouding.

Not only are the Ostiones-general vessels extreme, this general style is internally consistent. This suggests that the making and using of the Ostiones-general vessels may have been more controlled or regimented than for the other general styles (however, the small sample size for Ostiones-general may also have contributed to the apparent lack of variation). Many of these attribute values are what might be expected to distinguish a fine ware from a generalized utilitarian ware. It will be

recalled that these vessels are large, broad, shallow bowls or large platters, forms that might reasonably be expected to have been involved in public consumption events.

When examining all the attributes, the second clear trend is that Monserrate-general was consistently the closest in values to Ostioniones-general, and Cuevas-general was generally closer to Monserrate-general than to Late Incised-general. Lacking vessel-specific dating, two possibilities have been identified. The observed patterns may reflect a gradual change from Cuevas-general to Monserrate-general to Ostiones general, with an increased rate of change to Late Incised-general.

The other alternative is that the Cuevas-general, Monserrate-general, and Ostiones-general are all complimentary elements of a single component. Because the Cuevas-general style was defined on the basis of traits that also occur in low frequencies in Monserrate components, it seems reasonable that both are coeval. Likewise, the initial appearance of the open bowls/platters with interior thickened rims (i.e., the markers of Ostiones-general) may date sufficiently early to account for a low incidence of such pots in a classic Monserrate component (see Oliver 1995, Lundberg 2001, and Lundberg and Righter 1999 for early occurrences of this platter form). The coeval production and use of these three general styles would mean an increased diversity of vessel forms, as might be expected from a site with both domestic and ceremonial needs. By this model, the Cuevas-general would add a severely restricted vessel form not otherwise seen in the Monserrate assemblage, and the Ostiones-general would add serving platters to the mix.

The spatial data from the site show a high rate of co-occurrence of the three general-styles. The spatial distribution of vessel forms appears to be non-random and may suggest that the midden mound was established as a unique site area during the Jácana 2 occupation. Table 4 summarizes the vessel classes by site context for the Jácana 2 pots. It will be recalled that Vessel Forms A, B, and K are associated with the Cuevas-general style (green in Table 3), Vessel Forms L, M, and N are diagnostic of the Monserrate-general style (red in Table 3), and Vessel Forms G and H are diagnostic of the Ostiones-general style (blue in Table 3).

Table 3. Jácana 2 Vessel Form by Site Context.

Context/Vessel Form	A	B	C	D	E	G	H	K	L	M	N
Batey	0	0	0	0	0	0	1	0	2	1	0
Fx-F	4	2	1	2	0	0	7	2	4	11	2
FX-T12	0	1	0	0	0	1	2	0	1	3	1
Gully Top	1	0	0	0	1	0	3	1	1	0	1
Midden Mound	0	1	0	1	0	2	3	0	9	4	6

Note: Green are Cuevas-general, blue are Ostiones-general, red are Monserrate-general, and black are undifferentiated Jácana 2.

The three general styles do not have horizontally or vertically discrete distributions. Instead, in all Jácana-2 contexts on the site, the three co-occur. Cuevas-general, Monserrate-general, and Ostiones-general all apparently represent local production following a shared technological tradition, with slight variance in the production of Ostiones-general to yield red exterior colors. The spatial and ceramic data are consistent with the three general styles having been made and used coevally rather than sequentially.

As mentioned above, the co-occurrence of these three general styles is not surprising. Similar co-occurrence has been seen at other sites on the island. Table 4 presents summary comparisons with other dated assemblages from the region.

Table 4. Select Dated Assemblages, in Comparison with Jácana 2 Sample

Site/Dating	Similarities with Jácana 2 Sample	Reference
Hernández Colón, Fase Cerrillos A.D. 450-600	Plain and smoothed dominant. Red-stripe painting and overall red painting are present but rare. Incising very rare. Kaolin-paste occurs. D-handle with peg. 2-dimensional lugs. Vessels similar to Classes D, E, and H.	Maíz López (2002)
Hernández Colón, Fase MaragüezA.D. 600-650	Plain and smoothed dominant. Red-stripe painting and overall red painting are present but rare. Incising very rare. Kaolin-paste occurs. Loop handles. 2-dimensional lugs. Vessels similar to Classes B, D, E, G, and H.	Maíz López (2002)
PO-21, Circa A.D. 650	Vessel forms similar to Classes D, E, F, G, and H. Almost completely semi-burnished or burnished. Very little painting or incising. Loop handles. 2-dimensional lugs. Boat-shaped vessels.	Espenshade et al.(1987), Espenshade (2000)

El Cabo, Circa A.D. 600-900	Simple adorns. D-shaped handle. Boat-shaped vessels. Smoothed surface finish dominant. Painting and incising very rare.	St.Jean (2008a, 2008b)
Tutu Village, Assemblage 3 A.D. 600-750	Vessel forms similar to Classes A, C, D, E, F, G, and H. Loop handles. Annular bases. Platters/open bowls with interior thickended rims. Decoration rare. Overall red is only painting.	Lundberg and Righter (1999)
Lower Camp, A.D. 640-700	Vessel forms similar to A, B, C, D, E, F, and H. Boat-shaped vessels. D-shaped and Loop handles. 2-dimensional lugs. Very low occurrence of painting or slipping. No incising. Kaolin-paste occurs.	Oliver (1992, 1995)
Paso del Indio, E Levels, Circa A.D. 480-700	D-shaped handles. Painting rare, but overall red when occurs. 2-dimensional lugs. Rim points, rim buttons. Interior thickened rims.	Krause and Babilonia (n.d.)
PO-23, A.D. 200-780	Loop handles. 2-dimensional lugs. Boat-shaped vessels. Vessels similar to Classes D, F, G and H. Overall red painting.	Krause et al. (1995)
FASE AGUIRRE (south-central Puerto Rico), Circa A.D. 700-900	Dominated by smoothed, semi-burnished, and burnished pottery. Loop handles. 2-dimensional lugs. Boat-shaped vessels.	Rodríguez López (2008)
KING'S HELMET, A.D. 650-890	D and loop handles. Annular bases present. Vessels similar to Classes A, B, D, E, F, G, and H. 2-dimesnional lugs. Very rare incising. Smooth surfaces dominate.	García Goyco and Freytes Rodríguez (2008)
COLLORES, Ostionoid Component	Loop handles. 2-dimensional lugs. Very low frequency of painting. Incising almost non-existent. Boat-shaped vessels. Vessels similar to Classes D, F, and H.	Rodríguez López (1983)
MONSERRATE, Late Cuevas/Monserrate	D and loop handles. Annular bases. Vessels similar to Classes B, D, E, and H.	Roe et al. (1990)
AKLIS SITE, A.D. 600-890	Limited white-on-red painting. Predominately smoothed, semi-burnished, and burnished vessels. D-handles, some with top pegs. Vessels similar to Classes A, B, C, D, E, F, and G. 2-dimensional lugs.	Hayward and Cinquino (2002)
PETER BAY, A.D. 680-1235	Vessels similar to Classes B, C, D, E, F, G, and H. Rim points. Annular bases.	Lundberg (2001)

Pottery and Jácana-2 Site Function

The midden and features from the Jácana-2 contexts suggest that the site served as a residential hamlet. The initial Midden Mound was constructed in this period, and there is tenuous,

circumstantial evidence that a small batey may also have been present. The floral remains suggest the possible presence of managed tree gardens, where a variety of medicinal and ritual plants were grown. Pine resin may have been imported from off-island. Maize, guinea pig, and porcupine fish (all associated with ritual locations in the Caribbean) were consumed at the site. The intra-site variability in burial position and cranial deformation suggest the possibility of differential treatment by social status.

Does the nature of the Jácana-2 pottery assemblage match the functional interpretations of the site? Many vessel forms and sizes are present, with the diversity expected of a residential location. Most of the pots subjected to residue analysis have a generalized mixture of plant and animal signatures, suggestive of generalized cooking use. The assemblage appears consistent with the expectations for household pottery production.

There are also possible indicators of ritual or ceremonial activity among the pottery assemblage. Apparently, the Ostionoid-general platters and open, incised-rim bowls were considered a fine ware, and greater care was expended on their firing to yield red exterior colors. The evidence of pine resin on four of the vessels examined for residues is also suggestive of ritual activities during the Jácana-2 occupation.

CONCLUSIONS

The excavations of Jácana-2 contexts at the Jácana site, Site PO-29, yielded a large collection of pottery sherds. The study of 92 sample vessels provided strong data on the technological, stylistic, and formal attributes of the local pottery tradition at A.D. 650-900. Pottery that would be called Cuevan, Monserratan, or Ostionan style by the traditional Rouse approach was found to have been produced coevally within a single local technological tradition. The formal variability and use indicators are consistent with the site having served as both a hamlet and a ceremonial locus in this time period.

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Christopher T. Espenshade, Commonwealth Cultural Resources Group, 2530 Spring Arbor Road, Jackson, Michigan 49203 (cespenshade@ccrginc.com)