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Determining precolonial botanical foodways: starch recovery and analysis, Long Island, The Bahamas

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ABSTRACT

Descriptions of precolonial foodways in the Caribbean Islands have relied primarily on contact-period European descriptions, which have been used to inform archaeological research. The use of ethnohistoric and indirect archaeological evidence is debated, and competing reconstructions of potential botanical foods and their cooking processes have resulted. To address this issue, starch analysis, which is suitable to provide information on human-plant interactions in tropical regions with poor botanical preservation, was carried out on samples from shell and limestone potential plant-processing tools from the Rolling Heads site, Long Island, The Bahamas. Results of this study revealed that some of these shell and lithic tools were used to process several different starchy food sources: maize (*Zea mays* L.), manioc (*Manihot esculenta* Crantz), and coontie (*Zamia* spp.). The presence of more than one plant species on both the microlith and shell tools, demonstrates their multi-purpose use. These novel data have also generated interpretations of plant processing with limestone grater chips. Overall, our research provides integral data regarding regional-specific processing of manioc, maize, and coontie. This report provides new information regarding human-plant interactions in the Caribbean. Finally, this study provides data on the use of shell tools and lithic graters for processing plants it contributes to ongoing discussions of reconstructing ancient Bahamian and related Caribbean foodways.

1. Introduction

Descriptions of precolonial foodways in the Caribbean Islands have relied primarily on contact-period European descriptions.

The use of European accounts in conjunction with ethnographic data has been used to determine foodways predating these sources of information (Rouse, 1992). We adamantly believe this method of informing archaeological research should be heavily debated, and competing reconstructions of precolonial foodways have resulted. Interpretations of botanical foodways reported in the Spanish chronicles suggest that manioc (*Manihot esculenta* Crantz) and sweet potato (*Ipomoea batatas* (L.) Lam.) were the most important cultigens, while maize (*Zea mays* L.) was of limited importance (see Newsom and Wing, 2004; Pagán-Jiménez, 2013; Sauer, 1966). Despite numerous other botanical studies (Berman and Pearsall, 2008; Mickleburgh and Pagán-Jiménez, 2012; Pagán-Jiménez, 2007; Pagán-Jiménez et al., 2015) microbotanical remains representing manioc's ubiquity has been statistically insignificant (less than 13%) in the Caribbean archaeological record (Pagán-Jiménez, 2013; Pagán-Jiménez et al., 2017). In contrast, maize, sweet potato, bean (*Phaseolus* spp.), and coontie (*Zamia* spp.)[1] have been found in numerous studies in the broader Caribbean region (Pagán-Jiménez, 2007; Pagán-Jiménez, 2009; Pagán-Jiménez and Oliver, 2008; Pagán-Jiménez et al., 2015; Rodríguez Suarez and Pagán-Jiménez, 2008). Figueredo (2015) argues that maize was of greater dietary importance than manioc, whereas Newsom and Wing (2004:183) suggest coontie to be the primary consumed carbohydrate in The Bahamas. Veloz Maggiolo (1992), following Las Casas (1909), has also argued for the primacy of coontie, especially in the eastern Dominican Republic (Higüey Province). This study reports the first conclusive archaeological evidence for manioc and identified coontie in The Bahama Islands. Maize was identified in a previous study from The Bahamas (Berman and Pearsall, 2008), and is also recorded here.

Efforts to understand the diversity and use of botanical foods in the Caribbean has gained substantial attention in the last forty years

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[1] Plants of the genus *Zamia* are known locally in The Bahamas as coontie and thus, the term coontie is used to denote plants of this genus in the rest of this article.

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(Fortuna, 1978; Keegan and DeNiro, 1988; Newsom, 1993; Newsom and Wing, 2004; Pagán-Jiménez, 2007), most recently through the extensive application of novel methods (Laffoon et al., 2016; Mickleburgh and Pagán-Jiménez, 2012; Pagán-Jiménez et al., 2015; Pestle and Laffoon, 2018). Starch grain analyses have consistently revealed the identification of cultivated, managed, and processed plants that were once believed not to preserve for archaeological recovery. These microbotanical remains have proven to be resistant to the dry, wet, and hot conditions that are typical in the tropics and may affect preservation.

In the tropics, because of copious amounts of rainfall and consistent high temperatures, organic remains decompose quickly in the humid soils (Babot, 1996). Thus, archaeobotanical research is difficult and can be problematic primarily due to poor preservation. In addition, the majority of tubers do not produce, or are purposely suppressed from producing pollen and produce few diagnostic phytoliths in the plant organs that are utilized for food (Torrence, 2006). Starch analysis also has the potential for recovering the most complete archaeobotanical record of many prominent economic plants in the precolonial Caribbean (Pagán-Jiménez, 2011). Starch analysis has the unique ability to show human interactions for creating and modifying plant-based foods and this microbotanical remain preserves exceptionally well in tropical conditions.

The new information gained from this study exposes some of the phytocultural (human-plant interactions) dynamics of the precolonial Bahamas.[2] In 1492, the native peoples of The Bahamas were the first people encountered during the Spanish intrusions and were called Los Lucayos ("people of the small islands"), which has been anglicized as Lucayan. The earliest evidence for a human presence the Bahama archipelago is dated to around 700–800 CE (Berman et al., 2013). It remains an open question of whether colonists arrived from Cuba, Hispaniola, or both (Keegan and Hofman, 2017). It is thought that the first migrants into The Bahamas belonged to the Ceramic Age ("Arawak") colonization of the Antilles, which originated in northeastern South America around 500 BCE. There is, however, new evidence that their roots should be traced to the pre-Saladoid ("Ciboney") colonization of Cuba and that they practiced a horticultural economy (what Cuban archaeologists have called *modo de vida protoagrícola*) (Tabío and Rey, 1985; Veloz Maggiolo and Zanin, 1999). These differing conclusions have important implications concerning how botanical foodways in The Bahamas should be interpreted.

We begin with a discussion of the site from which the analyzed artifacts were recovered. Next, review the methods used, the taxonomic assessment of recovered starch grains, and the starch grains associated with the specific artifacts. We conclude with a discussion of the implications of botanical identifications for reconstructing socially learned practices of botanical food processing.

1.1. Archaeological background-Rolling Heads Site (LN-101)

Long Island was devastated by Hurricane Joaquin in late September 2015. In The Bahamas, eight hurricanes were reported between 1888 and 1960 causing the loss of life, houses, and crops (Mills, 2009:145–146). One hurricane every ten years was the average for The Bahamas (Doran Jr, 1955). Since 1960, an additional eight hurricanes have affected parts of The Bahamas, meaning hurricanes have increased to devastate this region at least once every seven years (Doran Jr, 1955, Islands®, 2017, 26, September). Climate change and the ensuing increase of storms are a direct and immediate threat to the Caribbean islands, the people, and their archaeological sites. One impact of Hurricane Joaquin was the substantial scouring of the 6-meter-high sand dune that rises above north-facing Lowe's beach north of Clarence Town (Fig. 1). Local residents Nick Constantakis along with Nick and Anthony Maillus found two frontal-occipital modified Lucayan skulls on the beach, and identified two places where human bones were exposed in the dune face (designated site LN-101). In October 2016, Pateman and Keegan excavated three skeletons from this unusual dune burial, but no cultural materials were found in association with the burials. They returned to the burial site with a team of volunteers in December 2016 and 2017 to establish the cultural context of the burials. Ground-penetrating radar was used to remotely sense the burial area, and a systematic shovel test survey was conducted along the top of the dune within five meters of the dune edge. No additional burials were encountered, but seven small activity areas were identified between Turtle Cove and Clarence Town (see Keegan and Mitchell, 1984 for a previous survey in this area). Artifact Kr1 came from a different site (LN-103; ST-16, 0-50 cmbs), which was found during shovel testing. LN-103 is east of LN-101, and about 800 m west of the main beach road in Clarence Town (Fig. 1).

One of these activity areas is located 60 m east of burial #1 (LN-101). It is possible that some of the site has eroded into the sea, but there were neither artifacts on the beach nor anthropogenic evidence on the dune face. One shovel test revealed a fairly dense cultural deposit, buried under 60 cm of sand. An L-shaped section of a $2 \times 2\,m^2$ was excavated to obtain a broader exposure (Unit 2). The artifacts (Kr2, Kr3, Kr4, Kr5, Kr6, Kr7 and Kr8, Table 1) in this analysis are from Unit 2 (FS 17, 60–90 cmbs; and adjacent FS 43, 70–90 cmbs). In one corner of Unit 2, there was the outline of a pit with a concentration of fire-cracked rock, ash, and black soil that has been identified as the remains of an earth oven (Fig. 2).

Earth ovens are ethnographically known to be comprised of seven parts: prepared basin, fire, layer of hot rocks, lower packing layer, food, upper packing layer, and an earthen cap (Black and Thoms, 2014). Archaeological remains do not typically preserve all seven layers. Instead, the primary components that preserve would be the prepared basin, the fire leaves an ashy layer, followed by darker carbon-stained sediments. The earth oven reported here has all of the expected archaeological remains in addition to an absence of pottery but a close association with lithic plant processing tools that would assist with food preparation for an earth oven (van den Bel et al., 2018).

The one AMS date from Unit 2 returned cal 1020–1060 CE (32.4%) and 1075–1155 CE (63%) from charcoal recovered at 70–90 cmbs in Unit 2.[3] Continued testing in the area revealed four similar activity areas separated by about 200 m. All are of small size, and in addition to LN-101, two other activity areas also had earth ovens (including EO#3 at site LN-102, located on a low dune 500 m east of LN-101). A common characteristic of these activity areas was evidence for the manufacture of shell beads. A complete description of the excavation is being prepared (Keegan and Pateman, n.d.).

2. Methods

The artifacts were selected based on Keegan's archaeological experience for inferring what could have possibly been plant-processing tools. The artifacts were hand bagged in the field and air dried on newspaper. None of the artifacts were washed or brushed. They were brought to the Caribbean Archaeology Laboratory at the Florida Museum of Natural History where they were again handled when measured, weighed, described, and photographed. The objects were then wrapped in aluminum foil, rebagged, and sent for analysis. Keegan sent these artifacts to the Faculty of Archaeology, Leiden University via Ciofalo. When the artifacts arrived at Leiden University, they were

[2] The Bahama archipelago designates a geographical area with two independent nations: The Commonwealth of the Bahamas and the Turks & Caicos Islands. There are notable differences in the archaeology of these islands (Keegan, 1997). Therefore, the current study focuses solely on The Bahamas.

[3] Lab # PSUAMS-1568, 960 ± 20 BP, cal AD 2-sig (OxCal), percentages reflect probabilities (P).