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Reassessing museum archaeological collections: unprecedented osteological and ceramic data for the Sucuriju site at the Urubu River, Central Amazon, Brazil

Reanalisando coleções arqueológicas museológicas: novos dados sobre o acervo osteológico humano e cerâmico do sítio Sucuriju, no rio Urubu, Amazonas central, Brasil

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Abstract: This article presents laboratory studies of the archaeological collection from the Sucuriju site which has been stored for decades at the technical reserve of the Museu Paraense Emílio Goeldi. These materials result from Mário Simões' investigations at the Urubu River area, in the municipality of Itacoatiara, Amazonas, Brazil, in the late 1970's and 80's. Recently, this region has been hypothesized as a cultural frontier and is considered key to understanding ethnogenetic and cultural interaction processes in late pre-Columbian times. The reassessment of this old collection, which remained untouched for over 20 years, yielded unprecedented osteological (dental) data for the site. The new analysis of Sucuriju ceramics enabled a better understanding of the local ceramic complexes. We highlight the need for integration between past and current research in this region in order to improve archaeological data both at local and regional scales.

Keywords: Amazon archaeology. Museum collections. Dental anthropology. Archaeological ceramics.

Resumo: Este artigo apresenta o resultado de estudos laboratoriais feitos em uma coleção arqueológica que está abrigada na reserva técnica do Museu Paraense Emílio Goeldi há décadas. Esta coleção, proveniente do sítio Sucuriju, resulta de pesquisas de Mário Simões na região do rio Urubu, no município de Itacoatiara, Amazonas, Brasil, efetivadas no final da década de 1970 e durante a década de 1980. Recentemente, levantou-se a hipótese de que esta região seria uma fronteira cultural e de sua crucial importância para a compreensão dos processos de interação etnogenética e cultural no período pré-colonial. A reanálise desta coleção antiga, que permaneceu intocada por mais de 20 anos, forneceu dados bioantropológicos dentários inéditos para o sítio. A nova análise da cerâmica do Sucuriju permitiu melhor compreensão dos complexos cerâmicos locais. Enfatiza-se a necessidade de integração entre a pesquisa passada e a atual nessa região para aprofundar o recolhimento de informações tanto em nível local quanto regional.

Palavras-chave: Arqueologia amazônica. Coleções museológicas. Antropologia dentária. Cerâmicas arqueológicas.

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INTRODUCTION

The archeology of the Central Amazon, particularly in the region of the middle and lower Urubu River, is characterized by a great variability of ceramic complexes as well as associated ecological contexts. Researchers working in the region have encountered difficulty in connecting these sets to the classic macro-chronologies of the Amazon region, particularly the Polychrome and Incised-Punctuated Traditions (Meggers; Evans, 1961, 1983), recognizing the peculiarity of the local archaeological record in the Late Ceramic Age (Simões, 1981; Simões; Machado, 1984, 1987).

The materials examined here were collected almost forty years ago at a site located on the Urubu River, close to the mouth of Madeira River, on the northern shore of Amazon River, in the municipality of Itacoatiara, Amazonas state, Brazil (Figure 1). The Urubu area is environmentally diverse something which is reflected in its current and former occupation patterns. It displays a high density of archaeological sites, most of which are composed by Anthropogenic Dark Earths (ADE) locally known as *Terras Pretas de Índio*, and suggests dense human populations in pre-Columbian times (*e.g.* Lehmann et al., 2003; Teixeira et al., 2009; Petersen et al., 2001).

The area has been hypothesized as an ancient cultural frontier for its geographic position and hybrid ceramic complexes, comprising melted amalgamated styles of three of the four ceramic traditions historically defined for the Amazon region (Machado, 1991; Lima; Moraes, 2011; Lima, 2013; Lima et al., 2016; Stampanoni, 2016).

This article addresses the research history of the Sucuriju site located in the Urubu archaeological area, the

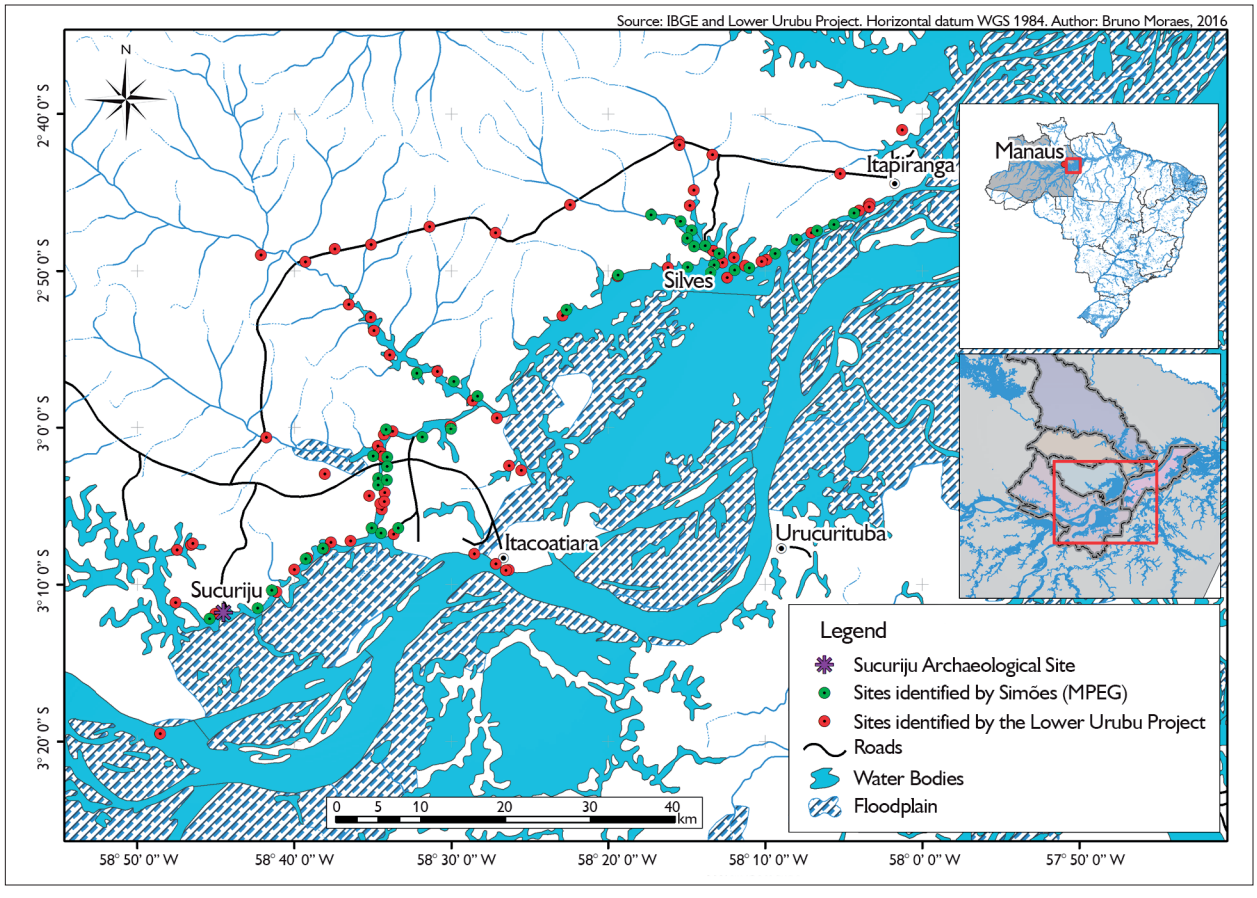


Figure 1. Map of the lower Urubu region with the sites identified highlighting the AM-IT-41:Sucuriju site. Map by B. Moraes.

recent return of fieldwork at the site and the new laboratorial approaches to its long salvaged collections, all of which are part of the Urubu Research Project. The overall objective of the project is to determine aspects of cultural and socio-political organization of the pre-colonial peoples who occupied the region of the lower Urubu River through an intensive study which considers multiple lines of evidence including archaeological samples and data recovered in the region.

Our focus here is on laboratorial work carried out on the collections from Sucuriju, which is housed at the Museu Paraense Emílio Goeldi (MPEG). The investigation includes analysis of its ceramic collection and the paleobiological study of the human remains recovered from the site. We aim at showing how these long-guarded Museum collections have great informative potential when new methods are applied.

RESEARCH BACKGROUND

PREVIOUS RESEARCH

The region has a long history of archaeological research. Even before scientific expeditions were conducted, chroniclers and early voyagers have pointed out the importance of the area for cultural studies. Various indigenous groups with important demographies, warfare, and regional sociopolitical organization were reported in the area since the writing of the first chronicles such as Carvajal (1942 [1542]), Acuña (1994 [1641]), as well as from later descriptions by Bettendorf (1910), Fritz (1922), and Daniel (1975).

The pioneer scientific exploration of the Urubu River and nearby areas was accomplished by João Barbosa Rodrigues (1875), who noticed it was intensively inhabited by indigenous groups. As a naturalist, his descriptions comprised botanical, ethnographic, geographic data as well as archaeological data, among which he recorded 'old' pottery, axes, and the remains of old indigenous dwellings throughout this area (Barbosa Rodrigues, 1875). In 1877, Ferreira Penna[1] also described similar evidence when referring to the most beautiful vessels from the cemetery site of Miracanguera, located near the town of Itacoatiara, Amazonas state. The ethnologist Curt Nimuendajú (2004), when trying to find this cemetery in the beginning of the 20th century, identified new sites with in the margins of Saracá Lake, in the present-day municipality of Silves (AM). These municipalities comprise the complex estuary of the Urubu River. The archaeology of this area was later explored by Hilbert (1968) and Simões (1980, 1981). They have identified dozens of archaeological sites, and first highlighted the diversity of the ceramic styles of the region.

Mário Simões, an archaeologist at MPEG, led two expeditions to the region, in 1979 and 1981. His purpose was to complement data from previous research in adjacent regions such as the Negro River to the west and the Uatumã and Jatapu Rivers to the east. Influenced by the diffusionist principles that characterized American anthropology at that time, Simões saw this region as a possible cultural frontier. He sought to establish areas of geographical dispersion of two great ceramic traditions of the Amazon region (Polychrome and Incised-Punctuated Tradition), investigating the migration and distribution routes, as well as possible influence of these traditions on local ceramic phases. Based on this work, Simões established a cultural framework of this area from prehistoric times to the Portuguese conquest (Simões, 1981, p. 1).

In two articles published in 1984 and 1987, Simões and Machado attempted to classify the local remains according to the traditions established for the Amazon basin (Meggers; Evans, 1961, 1983), but the data were not conclusive. The ceramic complexes they recovered did not allow an alignment to any of the four previously defined traditions. As a consequence of this typological problem they proposed the definition of a new tradition which they called Saracá Regional Tradition (Simões; Machado, 1984).

The artifacts collected during these archaeological investigations were deposited at the MPEG (in the Reserva

[1] Cf. letter from Domingos Soares Ferreira Penna to Ladislau Neto. Belém, June 24th 1877, folder 16, doc. 75, p. 1. Source: Sanjad (2011).

Técnica Mário Ferreira Simões – RTMS). However, no investigation in this area or on these materials was carried out until the beginning of the "Lower Urubu Research Project", described below.

THE LOWER URUBU PROJECT AND THE ARCHAEOLOGICAL COLLECTION

Following and updating of Simões propositions, the "Lower Urubu Research Project" was implemented by the Museu Amazônico of the Federal University of Amazonas in 2009. It aimed at carrying out archaeological surveys in this particular area in order to identify size, density, length and chronology of human occupations, as well as understanding the dispersion, social organization and the territorial boundaries of past human interactions in the area (Lima, 2013).

The project activities encompassed extensive archaeological surveys focused on the river shores and interfluvial areas, accessed by existing rivers or existing roads (Moraes, B. 2013) resulting in the identification of c. 70 sites. Additional topographic mapping and excavations of about 15 selected sites, next to the implementation of scientific and heritage education outreach activities was also part of the project (Lima, 2013). The archaeological material collected at archaeological sites (ceramic fragments, partially intact vessels, flaked and polished lithic artifacts, and samples of soil and charcoal) were studied in the archeology facilities of the Museu Amazônico in Manaus. The generated data led to the formulation of a preliminary hypothesis about the chronology of human occupation in the area, as well as to interpretations of the local social organization in the past (Lima; Moraes, 2011; Lima, 2013). These hypotheses have paved the way for continuity and development of this research proposal.

Since 2013, the base of the Lower Urubu Project has been changed in order to include the Goeldi Museum as an institutional partner. Therefore, the archaeological research in the region represents now a fruitful partnership between these two institutions. Nevertheless, the new artifact collections resulting from fieldwork are deposited at the Museu Amazônico while the old Programa Nacional de Pesquisas Arqueológicas na Bacia Amazônica (PRONAPABA) collections are held at the MPEG. Hence, the archaeological collection of the Urubu River is nowadays split into two locations. Furthermore, they have been collected in different research periods, using different approaches and methodologies. In this context, we highlight the need for integration between the research carried out in the same region, studied in different times and under different scientific perspectives.

Both archaeological investigations in the Urubu River area – the one carried out by Mario Simões during the PRONAPABA (Simões, 1980) and the current project – have shown great variability and peculiarity of the local ceramic complexes. Currently, ahead of the extensive and exploratory approaches previously undertaken, the Lower Urubu Project is turning its focus to a more intensive approach, aiming to correlate different sets of data already available or gathered for the area. In addition to that, this research meets the institutional demands of the MPEG regarding the management and study of the collections, since one of the project's priorities emanates from materials and samples already in existence in the museum's technical reserve.

THE SUCURIJU SITE

The Sucuriju site AM-IT-41 is located on the homonymous island on the outskirts of Gloria Lake, on a high bluff of the left bank of the Urubu River, in the municipality of Itacoatiara, Amazonas state (Figure 2A). It is located on a large extension of highly fertile soils, *Terras Pretas de Índio.* These Anthropogenic Dark Earths represent ubiquitous evidence of human transformation on the landscape (Lehmann et al., 2003; Teixeira et al., 2009; Petersen et al., 2001). Simões estimated the archaeological site to be 350 x 210 m (Figure 2B). However, fieldwork conducted by members of the Urubu project in 2014 revealed that the site seems to be significantly larger than previously reported by Simões. During this visit, we recorded the anthropogenic landscape including the *Terras Pretas* and mounds throughout the area (Figure 3).

A

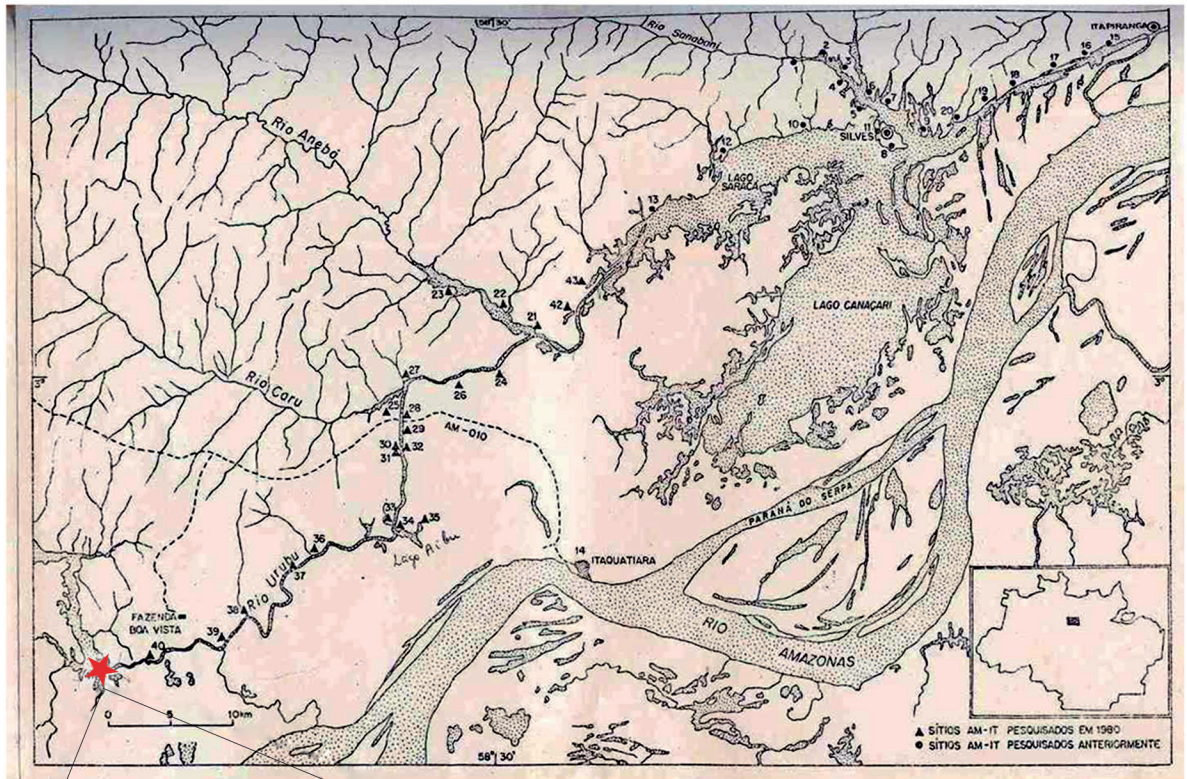
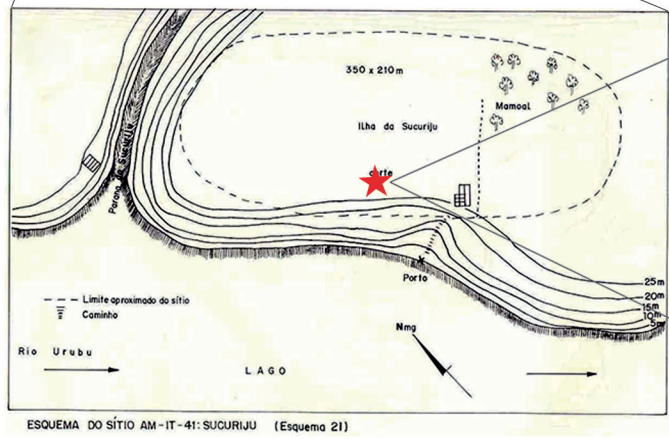


FIG. 2 - Mapa da área do baixo e médio rio Urubu e a localização aproximada dos sítios arqueológicos.

B



ESQUEMA DO SÍTIO AM-IT-41: SUCURIJU (Esquema 21)

C

Excavation depth (levels)	Dates	Lab n- SI
50-60 cm	A. D 740 ± 75	5095
60-70 cm	A. D 1135 ± 80	5603
80-90 cm	A. D 685 ± 90	5604
130-140 cm	A. D 140 ± 90	5069

Information adapted from Machado (1991,pages 56,57)

Figure 2. A) Map of the Lower Urubu river area with sites identified by Mário Simões. The red star indicates the location of Sucuriju site; B) AM-IT-41: Sucuriju, site layout sketch map. The red star indicates the location of the excavation; C) radiocarbon dates for Sucuriju site. Sources: Simões (1980); Machado (1991).

The site, which Simões considered the most important on this stretch of the river occupies a strategic geographic position, encompass islands, lakes, rivers, and canals (locally known as *furos*) connecting the Amazon (white water) and the Urubu (black water) river drainage during the high-water season (March-June). Its occupations have been radiocarbon dated (N = 4) providing a calibrated range between A.D. 140 ± 90 and A.D. 740 ± 75 (Figure 2C) (Simões, 1981; Machado, 1991).

The fieldwork carried out by Simões and colleagues at the site involved extensive surface collection of artifacts (diagnostic fragments) in the ADE area as well as the excavation of a 2 x 2 m test pit in artificial levels of 10 cm. The main objective was to collect a significant amount of ceramic fragments allowing for the establishment of a relative chronology through ceramic quantitative analysis (seriation) (Machado, 1991, p. 35). This area was selected by Simões (1980) and Machado (1991) for a more intensive study because of the thickness of the archaeological layer and the greater variety of decorated fragments compared to other sites in the area.

Figure 3. Sucuriju archaeological site in April 2015. The pictures show a mound and the Archaeological Dark Earth with high concentration of ceramic fragments on the surface. Photos: Nigel Smith, 2015.

MATERIALS AND METHODS

Laboratorial study was carried out on archaeological remains excavated from Sucuriju in 1981 and since then housed at the RTMS, in Coordination of Human Sciences/ Museu Paraense Emílio Goeldi/Ministry of Science, Technology, Innovation and Communication[2] (Araújo, 2015).

CERAMIC ASSEMBLAGE

The archaeological collection from Sucuriju comprises 10,651 ceramic fragments housed at RTMS. We have intensively analyzed a selection of artificial levels: the surface and the radiocarbon dated levels at 50-60, 60-70, 80-90 and 130-140 cm. The human remains (teeth and small fragments of bones) were also among the items selected for this study. Our selection represents 15.9% of the total ceramic assemblage excavated from the site.

The material had gone through a detailed curatorial process and analysis during the 1980s and 1990s (Machado, 1991). At that time it was washed with water and brush, numbered according to the criteria established by PRONAPABA, analyzed and eventually stored in paper bags on which the origin and type data were written.

The current ceramic analysis was guided by procedures described by Lima (2008) and Moraes, C. (2013)

[2] Field records, samples, and materials collected or produced during field and laboratory work are housed in the Archaeology Division of the Department of Human Sciences at the Museu Paraense Emílio Goeldi, along with digital copies of records and project data. All material stored in the Archaeological Collections at MPEG can be made available to researchers pending authorization of the Archaeology curator and the Department Head.

among other researchers working in Central Amazon region, adapting them to the specific characteristics of the Saracá ceramics. Special attention was also given to decorative associations, which were widely representative in this collection. We also sought to identify instruments and gestures related to the production of the artifacts (Araújo, 2015). The analysis was guided by the operational chain of ceramic production after Leroy Gouham's *chaîne opératoire* (Lemonnier, 1992). This attribute-guided analysis was performed by recording technological attributes on individual ceramic fragments by means of a spreadsheet in order to continue further descriptive and statistical assessments. The guide form comprises general categories: provenience (site, unity, depth); metric information (size, height, diameter, thickness); paste (temper, burning marks, manufacturing technique); surface (finishing and decoration techniques and motifs); morphology; use, and other cultural marks.

Laboratory work also aimed at modernizing storage and safe-guard standards, re-sanitizing and storing the fragments previously stored in paper bags. The collection has been in the technical reserve for almost 40 years and over those decades, curatorial, documentation and storage procedures of archaeological materials have improved leading to new approaches on conservation. The way the Sucuriju collection was stored was considered inefficient for several reasons: first, paper bags have a short durability and deteriorate easily, increasing the risk of material loss or mixture of materials, paper is also conducive to bioinfestation by mites and fungi, putting the safety of the collection at risk. The new storage methods applied intend to improve the conservation of the materials and to allow more enduring labeling of the pieces and bags (Cunha, 2015; Sales, 2016).

BIOANTHOPOLOGICAL MATERIALS AND METHODS

The osteological materials are composed of very few fragments of non-identifiable long bones, 25 permanent teeth representing most of the dentition of a single individual and few non-identifiable small fragments of teeth.

Compatibility of the dental pieces to the dentition of a single individual is attested by several morphological features including: color of the enamel; age at death estimates for different teeth; metric morphology; morphological compatibility between antimeres; concordance of developmental age for the formation of Linear Enamel Hypoplasias (LEH), and matching interproximal facets. All teeth are loose from the alveolar bone and no fragment of either the maxilla or the mandible was found along in the collection. Our working hypothesis is that due to the fragility of juvenile cranial elements, these were destroyed by taphonomic conditions of the context; however, destruction during the excavation work or misplacement/loss during transport cannot be ruled out.

This individual dentition presented limitations in some aspects of the study. First, due to the absence of the alveolar bone, paleopathological conditions associated with the osteological structure could not be observed. Caries is the most common infectious oral condition in human beings. In this study, methodology summarized by Hillson (1996) was used in the assessment of carious lesions.

The two-digit notation system developed by the Special Committee on Uniform Dental Recording of the Fédération Dentaire Internationale (FDI system) was used for tooth identification as suggested by the International Association for Dental Research (IADR) (Harris, 2005; Nelson; Ash, 2010).

Age at death of non-adult individuals from archaeological contexts can be estimated by different methods that rely on the assessment of the stage of development and maturation of different parts of the skeleton. The calcification and eruption of teeth provide more accurate estimates than bones, once the development of teeth are less susceptible to environmental and genetic influences (Schaefer et al., 2009). Age at death estimates in this study were assessed according to methodology

proposed by AlQahtani et al. (2010) for tooth calcification and eruption of permanent decidous teeth.

Dental hypoplasias are defects in enamel deposition during the formation of tooth crown. Although not a pathological condition in itself, it rather reflects physiological stress of the individual during the tooth calcification period. It can be expressed as discolorations, opacity, hipercalcification or stains of the enamel surface. More frequently, the affected teeth display plastic defects of the dental surface in the form of pits or lines. The etiology of hypoplasias is non-specific and can be associated with a series of pathological conditions such as infectious, metabolic or endocrinal diseases; malnutrition; or poisoning (fluorosis) (Hillson, 1996).

Hypoplasias are registered in archaeological samples, as an indication of physiological stress endured by the individual at a certain period. Hence, establishing its chronology helps infer possible agents causing the stress (Cunha et al., 2015). Aging of formation of Linear Enamel Hypoplasias (LEH) for Sucuriju 1 was made based on Reid and Dean's (2006) histological method for the estimation of tooth *striae* formation for permanent teeth.

Teeth wear out as a result of dietary needs, once mastication is paramount to proper human nourishment after the child is weaned. They also wear out unintentionally (1) when the mouth is employed in performing work-related activities; (2) by the action of objects constantly carried by the mouth for other reasons such as smoking pipes; (3) by contact of the teeth with hard objects pierced into the soft tissues surrounding the teeth (labrets, piercings, *tembetás* etc.); and, by pathological conditions (such as bruxism) (Hillson, 1996; Marado et al., 2014).

Tooth wear is registered in archaeological samples in order to provide data on types of diet, on cultural aspects, on the use of the dentition in working tasks and on the general health of the individual. Tooth wear can lead to tooth loss and other complications for the individual's oral health (such as pulpitis and other infections) (Hillson, 1996). In this study, tooth wear was scored according to methodology by Molnar (1971). Non-dietary tooth wear was registered following procedures proposed by Marado and co-authors (2014). According to this methodology, the surface affected by non-dietary wear (labial/buccal, lingual/palatal, occlusal, mesial or distal) is registered. Other data recorded include the shape of the lesion (concave, convex or straight); degree of the wear (in a scale of 1 to 5 where 1 represents slight wear involving loss of enamel layers and 5 represents destruction of tooth by wear); and the presence of chipping accidents and hypercementosis.

Dental plaque is a dense accumulation of oral micro-organisms and their by-products, along with other biotic and mineral contents. Minerals present in the plaque (ultimately derived from the saliva) favor its mineralization in the form of dental calculus (Hillson, 1996). Deposits of dental calculus are commonly found in archaeological samples. Despite being difficult to extract in living individuals, dental calculus flakes off rather easily from dry archaeological teeth (Silva, 2002). Their presence and size of the deposits are registered once these data might provide information on diet and predisposition of the individual for certain types of oral pathology.

Teeth are fundamental structures of the human body since they play an important role in the nourishment of the individual after weaning. As such, tooth development and morphology (both metric and non-metric) are genetically controlled (Scott; Turner, 1997). Discrete or non-metric dental traits are polymorphisms observable on teeth and bones of the oral cavity that result from genetic variation as human groups diverged from each other through micro-evolution, genetic drift and other mechanisms operating throughout our population history. Human populations are characterized by different frequencies of several dental discrete traits; hence, ancestry and biological affinities can be tested using these variants of the human anatomy. The Arizona State University Dental Anthropology System (ASUDAS) (Turner et al., 1991) was used here to score dental discrete traits of the individual from Sucuriju in order

to integrate his morphological profile into on-going studies of Amazonian Amerindian populations[3].

The dental pieces were cleaned using soft brushes and images were collected using both digital cameras and a digital microscope Dino-Lite 2.0.

RESULTS

CERAMICS FROM THE SUCURIJU SITE AND THE REGIONAL CHRONOLOGY

The ceramics from Sucuriju site are predominantly temped with cauixi, a freshwater sponge (Demospongiae, *Drulia* sp. or *Parmula batesii* sp.). The spicules can be the unique non-plastic added to the ware paste or it may be more often combined with other elements such as grog, *caraipé* (a burned tree bark today identified as *Licania* sp. Among modern Amerindian potters) and sand; as follows: *cauixi* (19.2%), *cauixi* + grog (20.9%), *cauixi* + *caraipé* (16.2%) and *cauixi* + sand (12.7%).

Vessels were manufactured by the coiling technique (94.6%), just as it occurs in most indigenous ceramics in Lowland Amazonia. Inferences about the burning processes are difficult, but the heterogeneous paste cores, ranging from light beige (oxidized) to dark gray (reduced) colors, suggest both open and closed, but controlled, burning environments. The surface color, another result of the relation between clays and firing environment and temperature, presented the following colours: beige (44.2%), orange (28.5%), and light brown (18.2%).

The collection showed high occurrence of the restricted vessels (83%), often referred to as transportation and storage ware (Barreto et al., 2016, p. 571), while the unrestrictive (open) serving wares comprise (16.4%) of the collection. Some of the latter profiles were not possible to determine, but most vessel shapes had either one inflection or multiple inflection points (complex vessel shapes) (Araújo, 2015).

Rim forms and inclinations also allow us to assess more concrete formal variations, either being related to uses and/or cultural orders (Barreto et al., 2016, p. 571-572). The predominant rim shape is extroverted (73.7%); lips are flattened (32%), rounded (22%) or beveled/oblique (22%) whereas bases are mostly flat (67%) within the total collection (Barreto et al., 2016, p. 571-572).

Regarding the finishing of the ceramic ware, this site is interesting because it shows a high percentage of decorated material, as well as a variety of combinations between different techniques: 86.7% of the analyzed sample presented single-technique decoration and 14.2% presented associated techniques.

A distinctive characteristic of the Sucuriju ceramics is the important application of punctuated decoration, classified as stamp-punctuated, drag-punctuated and stretch-punctuated, as well as other techniques that result in a similar visual effect. This technique is often applied on specific sections of globular vessels. In the latter forms, they are applied in the lower sections (mesial or lower) while the upper sections, close to the (everted) rims, are decorated by incisions and grooving (Lima et al., 2016).

Plates, griddles and open bowls, when decorated, concentrate the motives on the upper part of the rims, mainly being everted rims. In these cases we often find incisions and engraved circular designs.

The punctuated decoration and the everted rims or flanges are important diagnostic elements of these ceramics (Figure 4). These vessels are usually thin (0.3 to 0.8 mm) compared to other vessels of the collection. The instruments used to produce these effects, as well as the gestures related to its manufacture, seem to be extremely varied. We infer that the instruments may have had unique

[3] Programa de Capacitação Institucional (PCI) - Institutional Capacity-building Program research project entitled "A história escrita nos dentes do Goeldi: Antropologia Dentária e afinidades biológicas de populações amazônicas" (MCTIC 2015-2017, grant 312840/2015-2), coordinated by Claudia M. Souza Cunha, Museu Paraense Emílio Goeldi, Coordination of Human Sciences, Belém.

or multiple edges with U and V-shaped forms. Multiple-edge instruments may have had three or more parallel extremities, with the same or varying thicknesses. In some fragments, these punctuated effects are also produced by fingernails or fingertips.

Some cultural choices, such as the preference for upper parts and rims as support for the incised decoration, refer to the older ceramic tradition, in the region. In the Sucuriju site, as well as other ones in the Urubu River region, Saracá ceramics replace an older ceramic complex, stratigraphically overlying the Incised Rim/Barrancoid materials (Lima et al., 2006; Lima; Neves, 2011; Neves et al., 2014). Cultural processes regarding this cultural/historic phenomenom still need to be better understood and interpreted. However, it is valid to note the existence of some elements of continuity between the older Barrancoid and the Saracá ceramics, which blends with the main characteristics of the Incised-Punctate and Polychrome traditions. These features mark this assemblage as a unique Amazonian ceramic complex (Figure 4).

Figure 4. Sample of ceramics from Sucuriju site guarded at RTMS. Photo: Nigel Smith, 2015.

DENTAL REMAINS

In contexts undergoing intensive manipulation of the human remains such as secondary burials, most mono-radicular teeth will be loose from their sockets in the alveolar bone and chances are they might be statistically under-represented when compared to two-and three-rooted teeth (Silva, 2002; Cunha, 2015). Eighteen of the 20 mono-radicular teeth from this individual (90%) were excavated in close proximity and taken from the same stratigraphic unit. Although no anthropological fieldwork was performed during the archaeological excavation of Sucuriju, the presence of almost all mono-radicular teeth from immature fragile cranial remains raises questions on the funerary treatment used for this child. Extreme care in the collection of dental pieces and the use of some container to transport the materials from the primary burial site to its final resting place allowed for the preservation of most mono-radicular teeth. However, we cannot rule out that these remains were exhumed from a primary funerary context.

Most teeth in the sample presented taphonomic alterations to the roots (erosion and fragmentation). However, six immature permanent teeth could allow age assessment at death of this individual according to the degree of tooth calcification (AlQahtani et al., 2010). Five of those teeth (FDI 16, 17, 27, 46 and 47) indicate this individual was between 9.5 and 10.5 yrs. old at the time of death. One tooth (first right lower premolar, FDI 44) suggest an older age (11.5 yrs.). The presence of tooth wear on his premolars might reflect an earlier calcification and eruption of these teeth. Since this individual's premolars display some degree of tooth wear, he must have shed his deciduous molars some time before death. Once molars and upper canines are the last types of

deciduous teeth to be shed (AlQahtani et al., 2010), worn premolars and permanent canines explain the absence of deciduous teeth in the sample and might indicate premature loss of the posterior deciduous teeth.

Both LEH and pit-like hypoplasias have been observable on the Sucuriju child's teeth. The anterior dentition displays several events of LEH, although one posterior tooth (FDI 47) also presents hypoplastic lines. Events of poor enamel deposition on the surface of the teeth in this individual can be divided in three phases of his life. Between 1.1 and 2.4 years (yrs.) old, minor interruptions in enamel deposition of the upper central incisors might be related to the physiological stress imposed on the infant by the eruption of the deciduous dentition (Figure 5).

Between the ages of 2.5 and 3 yrs. old, all anterior teeth and the 1st upper molar display hypoplastic lines. Those are particularly marked on all the upper incisors and lower canines. Considering the age of the subject when these hypoplasias were formed, our hypothesis is that the physiological stress at this phase might have been caused by the weaning of the infant, his adaptation to solid food and the consequent intestinal and nutritional complications of this transitional period.

Tooth wear on this individual is very mild (average: 1.86, scale 0-8), ranging from 0 to 3, when 0 means unworn and 3 represents loss of enamel obliterating accidents on the superficial topography of the tooth (such as mamelons, accessory ridges and secondary occlusal grooves) and occasional exposition of small patches of dentine. Most severely worn teeth are incisors and molars. Dietary tooth wear on molars is symmetrical and located on the occlusal surface of the teeth.

First molars are the most severely worn teeth in the sample and patches of primary dentin are visible on the occlusal surface. Evidence of probable non-dietary mild wear is also observed on the buccal aspect of lower first molars. Both lower first molars display flat vertical wear on the anterior portion of buccal aspect of the teeth not compatible with either dietary wear or any

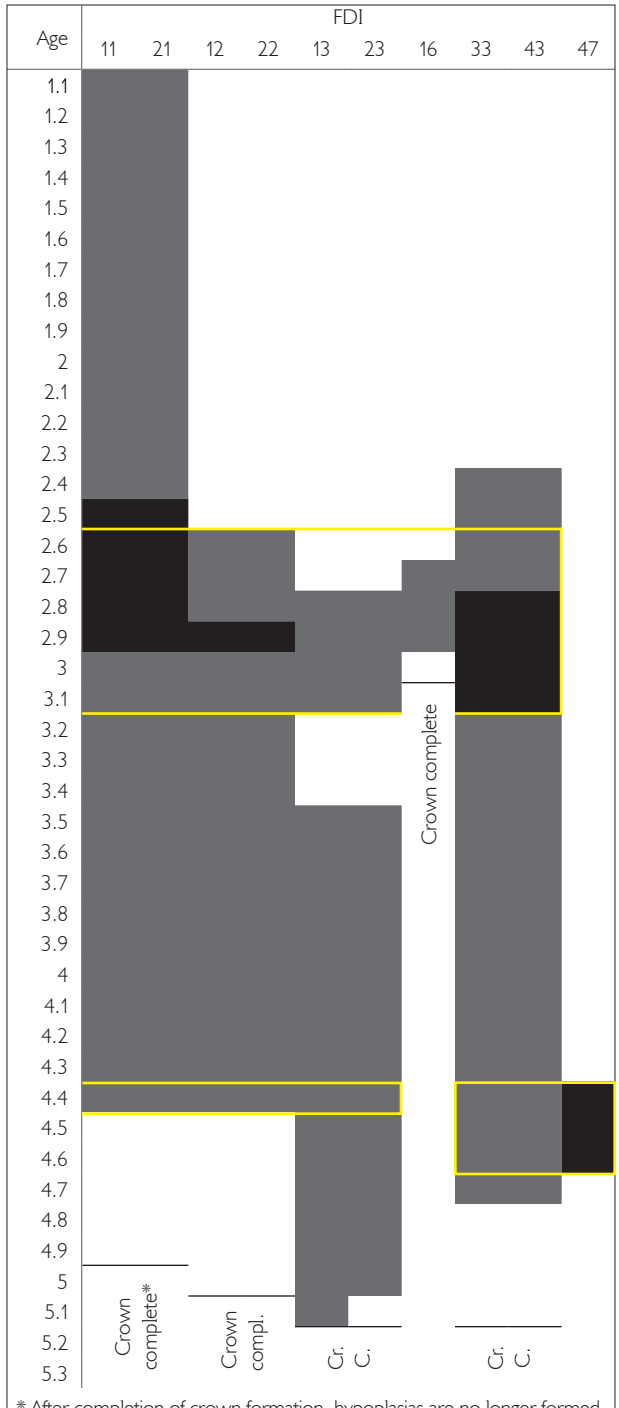


Figure 5. Distribution of hypoplasias per age on teeth in the sample. Darker bands represent more marked defects. Yellow outlines highlight periods in which different teeth are affected simultaneously by different degrees of defects. Source: Prepared by the authors.

damage produced by known types of overbite, overjet or malocclusion (Angle, 1899; Howat et al., 1991).

Dietary wear on incisors normally affect the incisal aspect of the tooth. The individual from Sucuriju displays incisal symmetric tooth wear at degree 3 on all incisors (Marado et al., 2014). All four incisors are marked by lingual vertical wear that might result from the use of teeth for non-dietary purposes (Figure 6). Although this wear is similar to the Lingual Surface Attrition of the Maxillary Anterior Teeth (LSAMAT) as described by Turner and Machado (1983), in the case describe here, the same type of tooth wear is not observed in neither the canines nor the premolars.

The first left upper premolar (FDI 24) displays an asymmetrical disto-lingual notched wear on the lingual cusp that is not compatible with dietary mastication. The presence of non-dietary tooth wear on these elements might suggest that they were used as tools.

Only trace deposits of dental plaque were observed on six teeth. Larger deposits might have been lost during excavation and curatorial procedures, that may suggest a diet poor in carbohydrates and/or rich in fibrous or abrasive food; however, we must not dismiss the possibility of hygiene habits preventing the formation of larger amounts of plaque.

A small interproximal carious lesion (fissure) was the only event of caries we could detect in the sample. It affected the mesial aspect of the upper left first molar on the cement-enamel junction (CEJ).

In terms of his discrete dental morphology, the child from Sucuriju presents no expression of trait suggesting either European or African descent. On the other hand, he does display marked shoveling on all the upper anterior dentition (Figure 7) and on the remaining lower anterior teeth as well, which is a typically Amerindian (Sinodont) trait. All anterior teeth express double shoveling on the labial aspect (another frequent Sinodont trait) which seems to extend to the premolars as well. The entoconulid (or C6), frequent feature in Amerindian populations, is also present and robust on both first lower molars (Figure 7).

Figure 6. Compatibility between FDI 11 and 21: color of the enamel; size of teeth; morphological compatibility between antimeres; degree of tooth wear, and matching interproximal facets (arrow). Vertical tooth wear affected the mesial accessory ridge of both teeth. Photo: Claudia Cunha, 2016.

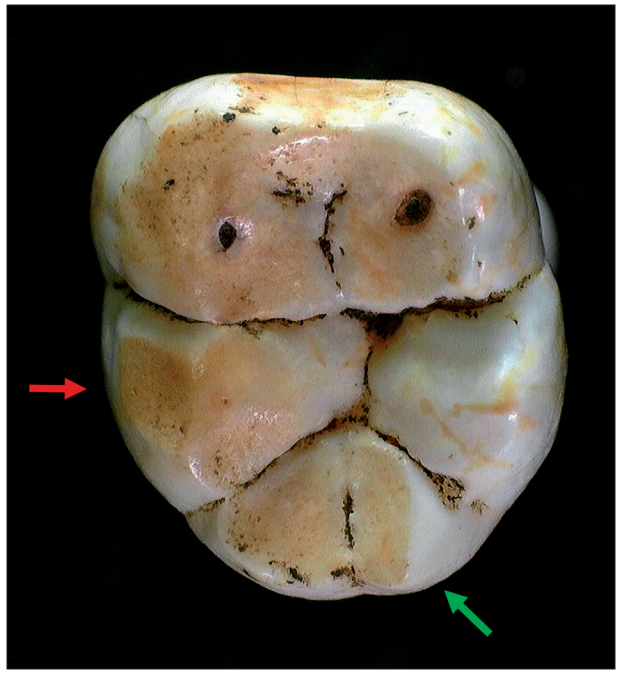


Figure 7. Occlusal and buccal tooth wear on the left 1st lower molar (FDI 36). Non dietary wear is also visible on the buccal aspect of cusps 1 and 3. Darker stains affecting different areas of enamel and patches of exposed dentine on cusp 1 and 2 are probably chemical contamination of mineral components in the anthropogenic dark sediment of the site. Photo: Claudia Cunha, 2016.

DISCUSSION

Archaeological research in the Central Amazon (which encompasses the Urubu river area) has increased significantly in the last 15 years, and has provided a well-established relative chronology for the area (Lima; Neves, 2011; Neves, 2012; Moraes, C. 2013). When connected to a broader area, the lower Urubu River region has been increasingly thought of as a cultural border area in the late pre-colonial past. Archaeological field and laboratory studies show a ubiquitous presence of ceramic sites related to three distinct ceramic traditions: Incised Rim, Incised-Punctuated, and Polychrome (Lima et al., 2016). The Saracá ceramics from the Sucuriju site does not differ significantly from other Saracá sites recently studied in the research area such as the Bom Socorro site by Stampanoni (2016) and the Pedra Chata site by Cavallini (2014). It encompasses the main characteristics of the three Amazonian traditions in terms of attribute associations (Figure 8).

It is not clear, however, how cultural change took place in the local ceramic variability. The four radiocarbon dates available range from A.D 140 ± 90 to A.D 1135 ± 80 A.D. (Cal.) (Machado, 1991), with an inversion in the sequence (Figure 2C). Our sample is very limited, but as far as we could record, there is no clear stylistic and technological change considering the excavation sequence. Having (re)visited the archaeological site, which shows massive mounds of ca. 1 m in height (Figure 3), we interpreted this area, which was excavated by Mário Simões, as a possible artificial mound similar to the ones found in the Central Amazon (Moraes, C. 2006, 2013; Lima, 2008; Neves, 2012 etc.) and elsewhere in the Urubu River area (Stampanoni, 2016).

Although the relationships between different traditions are not yet fully understood, the particularity of this Late Ceramic Age complex of the region seems clear. Saracá ceramics shows hybrid stylistic traits which can be attributed to the three different Amazonian traditions, and this local variability is currently interpreted as a mark of inter-ethnic contacts (Lima et al., 2016). As pointed out by Stampanoni (2016), who considers this

Figure 8. Saracá vessel from Sucuriju site: restricted vessel with reinforced rim, grooved and punctuated decoration. Source: Araújo, 2015.

specific region of cultural borders as a historical process, at least from 1000 A.D. onward, we would expect exogenous cultural elements to be coexistent with a local style: the Saracá complex. Cultural processes are thought to happen in contexts of cultural boundaries (Hornborg; Hill, 2011), and may result in a peculiar identity construction, for which ceramic style may function as a cultural indicator. The peculiarity of this ceramic complex, encountered on the lower Urubu River, is taken as a representation of a zone of intense ethnic interaction in the South American lowlands. In this sense, we allude to these processes as a cultural 'melting pot', resulting from the aggregation or appropriation of exogenous cultural traits into a local style. Despite specific histories, one can possibly compare this situation of such intense interethnic friction to the Upper Rio Negro Interethnic System (Hornborg; Hill, 2011) and the Chaco region also having long indigenous, colonial and post-colonial indigenous history (Carvalho, 1992).

Although no direct date is available for the human osteological materials, dates provided by other materials place the occupation of the site between A.D. 140 ± 90 and A.D. 1135 ± 80 (Araújo, 2015). The laboratorial study of the human remains from the Sucuriju site identified an almost complete dentition compatible with a single young individual. The age of this individual ranges between 9.5 and 10.5 yrs. at death and discrete morphological data indicates he must have been of Amerindian descent. Considering the stratigraphic depth of the teeth collection at 60-70 cm which has been dated at in A.D. 1135 ± 80, we are strongly inclined to believe that this individual was buried at Sucuriju and was culturally related to the producers of Saracá ceramics, which means he was living during a moment with strong interethnic interaction.

No pathological condition other than a single small carious lesion on one tooth (FDI 26) was observed on the remains. There are indications of the use of his front teeth and one premolar for some kind of non-dietary chore, which caused atypical tooth wear on the lingual aspect of upper incisors and on the lingual cusp of one premolar (FDI 24).

Enamel hypoplasias point to significant periods of physiological stress in his early childhood. One of these periods, between 2.5 and 3 years old, might correspond to the transitional phase between nourishment provided to the child by breastfeeding and his adaptation to solid food. Malnutrition and intestinal problems during this phase would have taken a toll on enamel deposition.

CONCLUSION

The reassessment of this old collection at the RTMS, which remained untouched for over 20 years, revealed new unprecedented osteological (dental) data for the site. New analysis of Sucuriju ceramic enabled a better understanding of the local ceramic industry, since it dialogues with and corroborates new studies for the regional variability. From this preliminary study we are confident that the Sucuriju ceramics can be taken as proxies for the Saracá complexes, and may consequently unveil the region's indigenous History.

This type of study contributes to the improvement of archaeological information both on local and regional scales, without the expenses and implicit destruction of an archaeological excavation. Although more archaeological fieldwork is needed in the Sucuriju site, there is still a significant amount of information in the technical reserve. This study clearly demonstrates that long-held excavated museum collections merit consideration as new sources of data and represent an enormous potential for archaeology in Amazonia.

In the lower Urubu River area, ceramic studies have hypothesized that this area represents a cultural border and we believe that bioanthropological studies are powerful tools to test this hypothesis through a better understanding of a human population's genetic histories and movements. We are aware that in order to provide data at the population level and, thus, enable comparative studies, further research on the paleobiology of other individuals from the same

chrono-cultural and geographic contexts are needed. Nevertheless, this work shows the potentiality for integrated bioanthropological-archaeological multidisciplinary studies in the area, regarding a broader understanding of this complex area in its deep pre-Columbian past.

Finally, we want to emphasize that, working exclusively with a museum collection of a single site excavated ~30 years ago, unprecedented information was recovered, thus allowing for the connection between old collections and new studies. This illuminates the importance of reassessing unexplored museum collections with new epistemological/scientific approaches, also highlighting this as a promising area for further interdisciplinary studies both at the population and artifact levels.

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