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Archaeology of the lower South of Bahia: engenho rio de contas, Itacaré, Bahia, Brazil

Abstract

The Engenho Rio de Contas is a sugar mill that operated along the river Rio de Contas in Bahia, between the 18th and early 20th centuries. In 2007, the construction of highway BA-001 (Camamu and Itacaré) gave the opportunity to collect and analyze the historical and archaeological data of this facility. This site was analyzed from the notion of "sugar mill" elaborated for the understanding of the productive system and distant from the traditional conceptions minted in the official historiography. Thus, it was interpreted as a large production structure, adapted to the local reality and immersed in a network of production and commerce, with diffuse territorial control.

Keywords: sugar mill, river rio de contas, archaeology

Volume 8 Issue 3 - 2023

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Received: November 26, 2023 | **Published:** December 07, 2023

Preamble of research in engenho rio de contas

The site called Engenho Conceição or Engenho Rio de Contas, in the municipality of Itacaré,[1] Lower South of Bahia (Figure 1), is characterized by a large production unit with its own port, recognized in the specific literature of the area as a royal sugarcane mill.[2] It is located on the left bank of Rio de Contas, in a stretch strongly influenced by the tide. This condition provides load-displacement for navigation of small and medium-sized vessels throughout the year.[1]

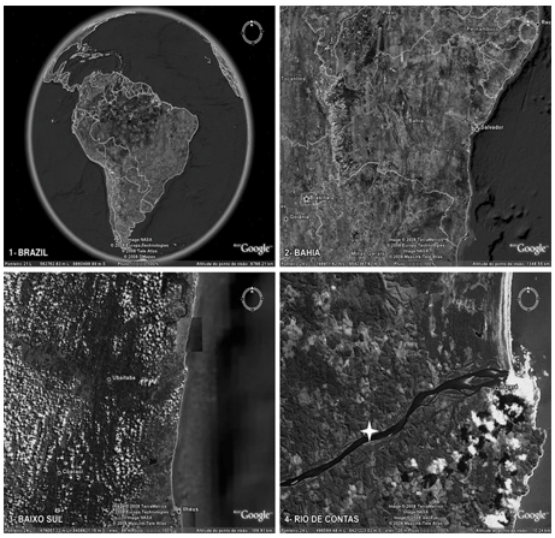

Figure 1 NASA footage captured by Google Earth. 1- South America, emphasizing Brazil; 2- Bahia; 3- Lower South; 4- Mouth of Rio de Contas, municipality of Itacaré. The star indicated on the left bank of Rio de Contas, in selection 4, represents the location of Engenho Conceição. Source: Google Earth, 2015.

[1]Text originally published in Portuguese in Revista da SAB, volume 31, number 2 (https://revista.sabnet.org/ojs/index.php/sab/article/view/607).
[2]The royal mills were those larger and better organized, which used water as the driving force of their milling machines, rather than animal force (ANTONIL, 1982 [1955]: 26).

The site is in a sector where the slope of the land is small, taking advantage of the foot of a hill in the river valley. Pedology presents, on horizon "A", a dark grayish sandy/clay layer, with a lot of humid aggregation, following with a gradual transition, already in the first 15 to 20 cm, to horizon "B", yellow/reddish clayey, typical of the Barreiras formation, with medium/high compaction. Water resources are abundant, composed of small rivers, streams, and tributary streams of Rio de Contas, such as the Engenho river, known for the same toponymy of the structure, approximately 200 meters downstream of its mouth in Rio de Contas.

These natural characteristics of the terrain provided the basic requirements for the installation and operation of a royal sugarcane mill, which are:

1) The existence of a perennial stream, not very large or narrow, that had an appropriate unevenness and width for the dam and the partial diversion of its waters to the driving wheel that will crush the cane.
2) A firm, flat, and wide enough terrain for the workshops, purge houses, furnaces, and other facilities and constructions of the service.
3) Fertile land where the cane is grown.
4) A production outlet, ideally a port of direct access to the sea since the product of the sugarcane mills, that is, sugar, was mainly intended for export to the European market.[2]

Currently, the area of the site is fully used for cocoa production, shaded by banana trees and large trees (both fruit trees and specimens of the local flora), so that the ruins of the sugarcane mill are permeated with vegetation, even overlapping the structures. Although, at first, this factor seems to constitute damage to the site, it was precisely the secular use for cocoa planting (started shortly after the abandonment of the area to produce sugar and sugarcane brandy) that allowed the mill to reach the present day in a good state of conservation and with well-conserved stratigraphy.

The Engenho Rio de Contas site was excavated within the scope of archaeological research aimed at the environmental licensing of the

BA-001 highway. The stretch of 48.1 km linear, located between the municipalities of Camamu and Itacaré, Lower South region of Bahia[3], allowed the identification, registration, and/or rescue of a universe of twenty-four archaeological sites[4]. Such sites represent different episodes of human occupation related to pre-colonial (large villages), colonial (residences, sugarcane mills, ports, and church), and post-colonial (residences and sugarcane mills) periods.[3–5]

Through these quick considerations, it is possible to situate the reader in the context of insertion of the works and preliminary information of the universe of approach. This article aims to discuss the archaeological works developed at Engenho Conceição and the results thereof, especially concerning the discussion of the classical notion of spaces where there were sugarcane mills in Brazil.

Archaeology in sugarcane mills and their historical notion in Brazil

Sugar production was present in much of the American continent, associated with the colonizing project of Portugal and Castile. The mills were part of the transatlantic expansionist experience, which began in the 15th century, on Madeira Island, the Canary Islands, and São Tomé, with different forms of work.[6] In the Caribbean and the State of Brazil, later called Kingdom and Empire, the classic plantation system had great success from the 17th century with the trafficking of enslaved people from Africa. Islands like St. Kitts, Antilles, Montserrat, Martinique, Guadeloupe, Jamaica, and Santo Domingo share, along the South Atlantic coast. This system primarily involved sugar production, with large capital inversion, slave labor, and the export market. This classic system generated sugarcane cultural landscapes with areas of cultivation, pasture, wood production, and construction of houses and buildings for manufacturing or industrial use. Sugarcane mills, purge houses, and distilleries conform in each region to different landscape installation modes, such as wind-powered sugarcane mills, which exist in the Caribbean and are little known in Brazil.[7] Other differences can be pointed out, such as plantation sizes, which were much smaller in the Caribbean than in the Northeast of Brazil.[8]

Historical archaeology in the Americas has been dedicated to studying these different sugarcane cultural landscapes since, from them, we can understand more than 500 years of permanence and transformations in the configuration of sugar crops. Archaeological research focused on understanding different perspectives, from the perspective of architecture, technology, landscape, the African diaspora, production, and consumption of material culture.

There is archaeological research on sugarcane mill sites in several regions of Brazil. We will mention some examples of investigations conducted in recent decades. In the Northeast, in Pernambuco, several sugarcane mills were researched, such as the Engenho Maranguape site,[9,10] Engenho Massangana[11,12] and Engenho Jaguaribe.[13] In the Amazon, in the municipality of Belém, excavations in the Murutucu sugarcane mill allowed several theoretical approaches and analyses of the exhumed material culture.[14,15]

In São Paulo, the Engenho São Jorge dos Erasmos, a national monument, was the subject of archaeological research in the late 1990s by Margarida Andreatta and later by José Luiz de Morais.[16,17] Still on the coast of São Paulo, the Ilhabela Archaeological Project identified several sugarcane mills, focusing the excavations on the Engenho Pacuíba I.[18] In the state of Rio de Janeiro, at Fazenda dos Jesuítas de Campo dos Goytacazes, the contexts associated with populations of African origin and their scrap patterns were analyzed.[19] In Goiás, in recent decades, a broad research program on the African diaspora in sugar farms has been conducted, especially in the Engenho de Santo Izidro and Engenho de São Joaquim sites.[20–22] Therefore, it is clear that, besides excavations resulting from licensing projects, there are important archaeological research projects in sugarcane mills. Due to their importance, they led to the realization of musealization projects, such as the Murutucu and Erasmos sites.

Additionally to the archaeological approach, much has been produced on the subject from the historical perspective. As in the conceptual plane, the confrontation of our field observations maintains dissonance with the data presented by historiography. We will focus, from here, the attention on the notion of the sugarcane mill. Given the common understanding associated with sugarcane mills, coined by researchers representing Brazilian official history – such as Gilberto Freyre (2012 [1933]), Sérgio Buarque de Holanda (1995 [1936]), André João Antonil (1982 [1955]), Roberto Simosen (1978 [1937]), Caio Prado Júnior (2011 [1942]), Stuart Schwarzt (1995 [1985]), Esterzilda Berenstein de Azevedo (1990 and 2009), and Geraldo Gomes (2006) –, it is appropriate to present and discuss the difference identified in the materiality of this phenomenon in the Lower South of Bahia.[2]

The conventional notion of a "sugarcane mill" is that of a productive, religious, mercantile, and social system, with close relations of servile, domestic, and commercial works that expressed themselves materially and systemically in space, from facilities such as the big house, the chapel, the sugarcane mill and the slave quarters.[23] This conceptual notion that evidences a concentrated socio-spatial model of sugarcane mills, on the one hand, served as a basis for understanding these contexts and, on the other, created an ideal explanation of sugarcane mills in the scientific and popular imagination.

Another way to understand these locations relates to the driving force used for crushing and extracting sugarcane juice.[24] When he studied the sugarcane mills of Pernambuco, the architect Geraldo Gomes conducted a count in which he classified these production units among those that used water as a driving force and those that used animal traction.[25] This "mechanical" model promotes a certain reductionism in the understanding of these spaces, insofar as it focuses the observation exclusively on how to obtain and use force for the extraction of the sugarcane juice, but does not observe the different associated productive units and their relations with the landscape (spaces for producing raw material, plantations, terrestrial, and aquatic outlets, etc.), in addition to excluding individuals who established sociability in these spaces.

Both concepts, whether concentrated socio-spatial or mechanical, although they can explain a series of Brazilian sugarcane mills, are not related to the archaeological contexts identified in the Lower South of Bahia, nor are they related to the historical documentation raised, which demonstrates different conditions from these conceptual idealizations.

The production units located on the lower bed of Rio de Contas are isolated, without proximity or apparent relationship with religious

[3]These works were conducted through a technical partnership agreement established between the Federal University of Bahia (Ufba) and the extinct Department of Transport Infrastructure of Bahia (Derba). For the technical feasibility of field and laboratory work, partnerships were established with SVC Construção Ltda. and Cbemi Construtora Brasileira e Mineradora Ltda. Finally, such works obtained research authorization through Ordinances issued by the Institute of National Historical and Artistic Heritage (Iphan), an agency linked to the Ministry of Culture (Minc).

4See Fernandes and Costa (2006), Fernandes (2007), and Costa (2008).

areas or housing. In the municipality of Itacaré, Bahia, the traces of small, medium, and large sugarcane mills, understood as official sugarcane mills[5], are located far from big houses, chapels, churches, and slave quarters. That is, we have a model distant from that expected in a conceptual aspect.

The same situation of spatial separation is identified in the neighboring municipality, Camamu. In the spaces occupied by the Jesuits, the mills are not close to the housing and religious areas. In this specific case, the dwellings and religious spaces were conjugated and distant from the sugarcane mill area, unlike the concentrated socio-spatial concept, whose family area was separated from the religious one and close to the productive area of the sugarcane mill. The similarity with this concept is related only to the functions more pragmatically assumed by the different production units. They differ, therefore, in the actors and the established social relations and the assemblages of spaces.

In the mechanical concept of Geraldo Gomes, if the sugarcane mill was powered by water, it could not be powered by animal force, and vice versa; one condition necessarily excluded the other. Also, according to this author, the two traction forces were used in the same space only under exceptional conditions of very powerful sugar mill lords.[25] Due to the extreme limitation of this concept, especially for the archaeological observation of spaces without the support of historical documentation, the realities would be treated as if they were two different production areas, which would lead to serious misinterpretation.

With this approach, we want to demonstrate that the way we perceive the concept of "sugarcane mill" influences the identification of the archaeological site. We believe that, although there is a prior need to know the literature and the ways of approaching the theme, the archaeologist should be aware and be careful with the forcible shaping of the data in pre-established theories and models under penalty of starting the research process with ready answers and not providing the interpretation that archaeological data make possible about cultural realities. Although the contexts are similar, they should be considered singular and socially dynamic. Within the scope of the discussion we propose, we want to conclude that the field reality will be decisive in conceptualizing the notion of a "sugarcane mill".

Thus, perceiving the distance from other Bahian realities and considering the contexts of the Lower South, characterized by the exclusivity of production structures (distant from the other units), besides the impossibility of relating to the concepts identified in the literature, we use as a procedure to conceptualize the sugarcane mil sites the relationship of the following conditions: "the driving force (water); the production area (milling, furnaces, and purging); [...] the production outflow (port)"[2] and the relations with the social landscape of the region. Choosing this observation procedure of archaeological contexts leads to empirical data being the construction motto of the research conclusions.

Historical news about engenho conceição

The first historical data regarding the mouth of Rio de Contas, in Itacaré, date from the sixteenth century and recommend that, at that time, this area was not yet populated due to the presence of the Aimorés, indigenous people that the colonizers considered hostile, as corroborated by data from Gabriel Soares de Sousa:

> There is this rio das Contas, which the Indians call Jussiape, to get to know it, who comes from sea to outside, over the mouth, some open fields of the forest, and to the sea a rock like an islet that is in the same mouth, through which vessels of honest size enter because they have a bottom and a channel for this that are very close to this rock. This river comes from far away and always brings more water than the Tagus, which navigates from the bar to between seven or eight leagues to the Waterfall, and from it upwards, one can also navigate because it has a bottom for that. And it is full of fish and seafood and much hunting, whose land is thick and good, and has many brooks for sugarcane mills that come into this river (which are no longer done out of respect for the Aimorés, so it is not inhabited) which is fourteen degrees and a quarter. From this rio de Contas two leagues away is another river called Anemoão, and from it one league away is another river called Japarape, which passes the ford along the sea, also depopulated.[26]

Even though the indigenous people, specifically the Aimorés, were the alleged obstacles to the settlement of this territory, the historical data, a while later, would demonstrate that such settlement occurred precisely from an indigenous village. The Jesuit Luis de Grã later catechized this village. These data advocate that, in this location, a chapel was erected under the protection of Saint Michael, and the village was first named São Miguel da Barra do Rio de Contas. According to the Encyclopedia of Brazilian Municipalities, the village of São Miguel already existed in 1718, being, in that year, elevated to the category of a parish. Subsequently, on January 27, 1732, the donee Ana Maria Athaide de Castro would determine that São Miguel da Barra do Rio de Contas be elevated to village and municipality.[27]

Concerning the sugar production units, in the "Sugarcane Mill Registration Book"[6] found in the Public Archive of the State of Bahia, there are, from 1807 to 1889, six properties in the locality of São Miguel da Barra do Rio de Contas, or simply Barra do Rio de Contas, term of Ilhéus. Among the six sugarcane mills, we concentrated the survey on the inventories of the Martins de Lima family, owner of Engenho Conceição da Boa Vista, registered on July 24, 1832, with a short distance from the port of embarkation (1/5 league). This sugarcane mill refers to the production unit whose location and dimensions information are compatible with the archaeological data. The Martins de Lima family had, at the time of the inventories and registration of the sugarcane mills, in the middle of the nineteenth century, seven direct heirs with rights to the lands of Engenho Conceição, in addition to neighboring properties. It was a family with many inheritors, despite being very divided.

From the inventory of Captain-General Manuel Martins de Lima, dated 1876[7], one can deduce that his share in the family lands would be divided with other heirs: Ignacia Delfina de Jesus, Lieutenant Manoel Lopes Ferreira by the head of his wife Maria Delfina de Jesus Lopes, Idalina Martins de Lima, Virginio Martins de Lima (deaf and unable to speak) and Captain Lucindo Martins de Lima (brother). The appraisal was conducted at Fazenda Conceição, with the presence of the heirs and their representatives, appraisers, Judge of Orphans and Absentees, and law official, who pointed out a large amount of assets, that is, lands, houses, and production units. Specifically for Engenho Conceição, real and built in stone and lime, its possessions and associated lands were divided as follows:[28]

> [...] p.11 The seventh part of the three-quarters of Engenho Conceição, with all its partitions, built of stone and lime, moved

[5]In the Public Archive of the State of Bahia are the Sugarcane Mill Registration books the Captaincy of Bahia, where the production units were originally registered.

[6]Colonial Section - Registration of mills of the Captaincy of Bahia; period - 1807; bundle 632.

[7]Judicial Section - Inventory - Classification 02/901/1370/06; Location - Barra do Rio de Contas; Year - 1876; Inventory - Captain General Manuel Martins de Lima; Administrator - Manuel Lopes Ferreira.

by water, which they valued (p.11v) by one conto two hundred and eighty-five thousand reis. 1:285#000

A quarter of the same sugarcane mill described above, which the deceased person had by paternal inheritance, which they valued at one conto and two hundred thousand reis. 1:200#000

The seventh part of the four hundred fathoms of land, in the same sugarcane mill, starting from the mouth of the front and meeting with lands of the heir Virginio, with their respective funds that valued it by three hundred thousand reis. 300#000

It should be noted that besides the mill, land, and assets were identified in the inventories in Cachoeira, Pancada, and Pau Brasil locations. The sugarcane processing equipment, other crops, and final products are included in this inventory: p.12v Three quarters of the sugarcane still and hood existing in the same sugarcane mill, valued at four hundred thousand reis. 400#000

A quarter of a large field of manioc still green, which they shall value by twelve thousand reis. 12#000

A quarter of another site of the said small one, already in a state of plucking, which they valued at fifty thousand reis. 50#000

A quarter of a cane field which they valued at fifty thousand reis. 50#000

The third of the house in which Antonio Rodrigues lives, with all his funds, on its own floors, which they valued at one hundred and fifty thousand reis, thus rendering the value previously given ineffective. 150#000

Four barrels of brown sugar, containing six arrobas each and all twenty-four, valued at two thousand and five hundred, and all by seventy-two thousand reis. 62#000

p.13 Two aforementioned containing twelve arrobas of white sugar, which they valued the arroba at three thousand reis and all for twenty-four thousand reis I say they all for thirty-six[8].[28]

Also, in the inventory of Captain-General, canoes were appraised, probably used to transport the cane to the port or production to the other regions of the Captaincy:

p.11 A vignette canoe of two palms and [two] mouth, called [Preta] baixa, valued at fifty thousand reis. 50#000

Another aforementioned of potumujú, two and a half hands of mouth already used that they valued at thirty thousand reis. 30#000

Another little vignette, which they valued at twenty thousand reis. 20#000

Those above to end up existing in the forests of Oricó, which they valued at twenty-five thousand reis. 25#000

Other members of the Martins de Lima family with shares in Engenho Conceição were Delfina Martins de Lima and Celestino, Setúbal and Virgilio Martins de Lima. The other inventories located were those of Delfina and Virgilio. What can be obtained from reading the inventories is that Manuel Martins de Lima had seven direct heirs, and his brothers, Delfina, Virgilio, and Setúbal, had their parts of Engenho Conceição and other properties, which would be divided by other heirs.

In Delfina's inventory,[9] the list of heirs is illegible. Her lands and properties are practically the same as those listed in Manuel Martins de Lima's inventory. The time between Manuel's death and Delfina's is less than a year. Among some of the assets identified in Delfina's inventory are:[29]

The villa in Engenho Conceição, built on pillars, all with floor, covered with tile, glazed, with a lined front room, with one hundred and twenty palms in front and its respective backs, in its own land on the same sugarcane mill, which they valued at the amount of one conto de reis 1:000#000

Engenho Conceição, I say three parts of Engenho Conceição with all its belongings and accessories, of stone and lime, powered by water, which they valued at nine contos de reis. 9:000#000

Half of the copper and hood Still, existing in the same Sugarcane Mill, although new, they valued at the amount of three thousand reis. 300#000

Four hundred fathoms of land in the same Engenho Conceição starting from the mouth of the [ant] to meet with the coheir (p.12) Virginio's lands with its respective back, which they valued at five thousand kings each fathom and all by two contos de reis. 2:000#000

A saw powered by water, sawing wood, and existing on the same Farm and Engenho Conceição, powered by the water of the same Sugarcane Mill, which they valued at the amount of two contos and five hundred thousand reis. 2:500#000

The fourth league is a small cane field on the land of the late coheir Manoel Martins, which they valued at the amount of one hundred thousand reis 100#000

The half of ninety-eight loaves of sugar, containing one hundred and thirty-five arrobas, which they valued at the amount of three hundred thousand reis. 300#000

(p.13) A shed to store sugarcane, which they valued at twenty thousand reis. 20#000

As can be seen, the list of sugarcane processing equipment is more detailed in Delfina's inventory than in Manuel Martins', which allows us to understand that Delfina had more assets. This factor leads us to consider that the possession of the still and the water-powered saw may be due to the purchase of the right of other heirs.

In the early twentieth century, despite the relatively significant cocoa production in the region of Ilhéus, where Itacaré was part, in the Manuel Martins de Lima inventories, references are made to only two thousand plants[10].[30]

As evidenced, the Martins de Lima family owned rural properties along Rio de Contas. Engenho da Conceição was well-structured, with equipment suitable for production, powered by water, and a port for the production outflow. The inventories show that the family owned only Engenho Rio de Contas. This, in turn, was supplied by various sugarcane plantations. Production had its profits divided between the different heirs. Those with a direct degree of kinship had a greater share of participation in relation to those with collateral kinship.

[8]Judicial Section - Inventory - Classification 02/901/1370/06; Location - Barra do Rio de Contas; Year - 1876; Inventory - Captain General Manuel Martins de Lima; Administrator - Manuel Lopes Ferreira.

[9]Judicial Section - Inventory – Classification 07-3175-04; Location - Barra do Rio de Contas; Year - 187[?]; Decedent - Delfina Martins de Lima; Administrator - Celestino Martins de Lima (brother).

[10]In João da Silva Campos' book, cocoa farmers began to appear politically from the first decades of the twentieth century, and the product obtained a good appreciation as early as 1909, which boosted infrastructure works in the city, creation of schools, and strengthening of trade (CAMPOS, 2006 [1947]: 491-506).

After the nineteenth century, no records related to the sugarcane mill were identified. From the historical documentation, it is believed that there was a gradual abandonment of the properties due to new production processes.

Archaeological interventions and contexts identified

The purpose of the excavations was to characterize the sugarcane mill. For this, procedures were adopted that intervened as little as possible in the structures, preserving most of the contexts as an evidence block. The surveys were distributed regularly in spaces of the ruins that would allow a broader and more diverse description of the space. They also evidenced an artifactual non-biased sampling, representing all production unit sectors[11] (Figure 2). Furthermore, we recorded the remaining architectural structures, mapped, and recorded two dams with their conduction gutters, which stored the water that served as the engine's driving force.

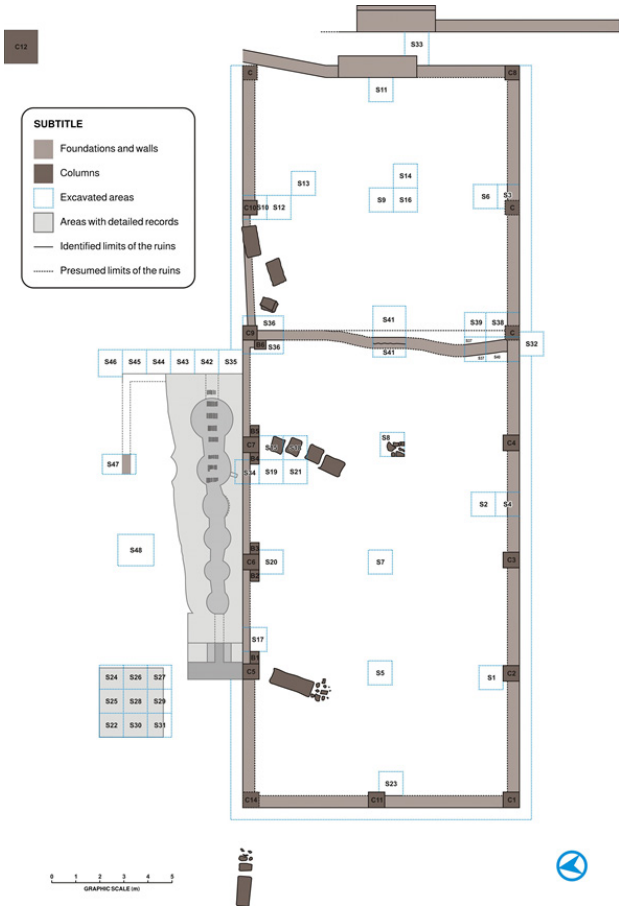

Figure 2 Plan and distribution of the ruins of the sugarcane mill, with identification, in blue lines, of the archaeological intervention sectors. Design: Carlos Costa, 2007.

As seen in Figure 2, the sugarcane mill's architectural design is rectangular[12]. It is possible to find two alignments with seven columns each, arranged parallel to each other, located on the north and south faces of the sugarcane mill. Besides these column alignments, an isolated column was also located in the central area of the western face. Although the structural relationship of the two-column alignments in the same construction unit is evident, there are differences in shape related to the function each side of the sugarcane mill fulfilled.[31]

On the northern face of the mill, corresponding to the back, next to furnace 1 (which will be better described in front), the columns, which are aligned, have different dimensions, the first of which, from the foundation to 1.20 m in height, maintains the width and thickness of 64 cm; from 1.20 m, there is an abrupt reduction of 10 cm in its dimensions, that is, it becomes 54 cm in width and thickness. Moreover, on the east and west sides of the columns located next to furnace 1, small support bases seem to provide greater structural strength to the furnace and the sugarcane mill building.

In turn, the columns of the southern face of the mill had an average width of 65 cm on the southern and northern faces, projecting with this same dimension in all its height. However, on the east and west sides, the bases of these columns had a measurement of 74 cm and a gradual reduction in the width of about 10 cm for each meter of height. These characteristics lead to these columns acquiring a shape similar to that of a wedge.

Regarding the composition of these structures, these are columns made with mixed mortar, composed of "colonial bricks"[13],[32] small and large angular rocks, reuse of brick pieces, tiles, ceramic fragments, joined by a mortar of yellow clay, sand, and lime. The fact that there are reused ceramic fragments allowed us to obtain a relative dating of this context. A fragment of thin shell-edged/blue-edged faience was embedded in the column's mortar (Figure 3) that, according to Fernanda Tocchetto et al., would have been manufactured between 1780 and 1850.[33] Considering the rates of production, use, disuse, and disposal time[34] of these faiences in Brazil, the possibility is that this part of the sugarcane mill was built between the second and third quarters of the nineteenth century.

Figure 3 In one of the columns of the South face, purging area, the presence of a fragment of thin faience embedded in the mortar, Shell Edged, Blue Edged pattern, is indicated. Photos: Carlos Costa, 2007.

[11]The excavations were conducted through surveys with a standard size of 1 x 1m and trenches with 0.5m wide, until reaching the natural soil formation. All excavations were done by artificial levels every 10cm. In all, about 120m² were excavated, with just over 510m² available. That is, just under 25% of the site, so that most contexts are preserved. Besides, we mapped the surroundings to verify the existence of other units associated with the sugarcane mill, such as the big house, slave quarters, and chapel, which were not archaeologically identified. Recalling, as we saw in the primary documentation about the sugarcane mill of Conceição, this absence makes sense, because in fact there are no records of other units built beyond the productive space of the sugarcane mill.

[12]"The main characteristic of the architecture of Bahian sugarcane mills, in the first half of the nineteenth century, is the shed-shaped factory, with a rectangular plan formed by three or more naves and covered by a single roof of four or two waters, supported by masonry supports or pillars. Generally, the central nave was supported by wooden scissors of up to 12m of span and the lateral ones by half-scissors or beams of up to 6m of span. Many factories had balconies on one or two sides of the shed. It is noteworthy that these constructions appeared in the Recôncavo as early as the eighteenth century, but only became widespread in the following century" (AZEVEDO, 2009: 117-118).

[13]Solid pieces, made in cast mold, dried in the yard, and roasted in pottery furnace.

Citation: Costa CAS, Comerlato F, Cunha CS. Archaeology of the lower South of Bahia: engenho rio de contas, Itacaré, Bahia, Brazil. *J His Arch & Anthropol Sci.* 2023;8(3):181–191. DOI: 10.15406/jhaas.2023.08.00291

Between the columns, parts of walls with an average width of 50 cm and the same structural conformation of the columns were identified on foundations composed of large rocks joined by the mortar of yellow clay and sand.

The surveys conducted inside the sugarcane mill circumscribed to the area of these columns allowed to show the specific function of this space. In the surveys conducted on the side of furnace 1, a large number of sugar loaf-shaped fragments (which, in some cases, formed quite significant pieces of whole containers) were found in the layer corresponding to the floor, that is, composed of ashes fallen from the furnace (Figure 4). Allied to this, there is the fact that it is the sector of this production unit with the lowest topographic elevation. The surveys excavated in the central area, on the south face, or a foundation of internal division of the sugarcane mill, conducted in the circumscription of the contexts described above, did not present other traces besides tiles, which contributed to defining the elevation of the mill floor. All the characteristics described, which consider the topographic elevation of this sector (low), the fact that it is next to the furnace, where the surveys showed a high concentration of sugar loaf-shaped fragments, allow us to conclude that this is the purging area of the sugarcane mill.

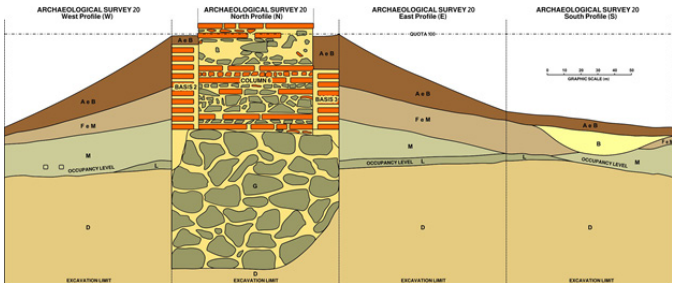

Figure 4 In the survey profile next to furnace 1, it is possible to notice layer L, corresponding to the ash level, marking the mill floor's elevation. Design: Carlos Costa, 2007.

As Carlos Magno Guimarães and collaborators teach us, if we consider the topography of a sugarcane mill, it will always be possible to identify its installation in two planes, which established a gap between them that had as reference the depth of the combustion chambers of the furnaces. The difference in levels was not a standard devoid of technical justification: it allowed the juice to be transported by gravity from the sugarcane mill to the furnaces or to some place where it would ferment in the case of spirit production. In other words, on an upper platform, the milling equipment was located; while on the lower platform were the furnaces, fermentation troughs, de-molding tables, etc. Once the sugarcane was milled, the juice was transported through spouts to the lower platform, where its destination was defined: hardened brown sugar or spirit.[21]

Thus, in the highest portion of the sugarcane mill, located on the east side, the columns that circumscribe this space indicate a distinct function for this sector, but are complementary to that previously described. Nevertheless, before entering into the functionality discussion, it is worth highlighting some differences in the columns now presented since these differences configure key elements for reading the temporality and precedence of this sector in relation to the first. Here, the columns have different sizes and compositions since their average sizes are 57cm wide and thick and are composed of solid bricks made of cast mold and mortar with yellow clay, sand, and lime. Joining these columns, there are foundations between 50 and 60 cm, made with large rocks and yellowish clayey mortar. In this sector, the topographic elevation of the dirt floor – identified by a layer of more or less 5cm thick of compacted red clay – is 1.70m above the floor of the area identified as purging. Furthermore, this area is next to the outlet of the water wheel chute.

These characteristics lead us to two considerations. The first is that the size of the area circumscribed by this second set of foundations and columns, location in relation to the structures already described (purging and water wheel), and elevated topographic elevation, make us recognize that it is the milling area, from where the sugarcane juice would flow by gravity to the furnace 1. The second consideration is related to the distinct composition of the structures since the archaeological data allow us to conclude that this sector was built at a time before the purging area. In fact, these statements seem to have meaning since, in addition to the difference in composition and shape of the columns, the constructive limits of the different moments of manufacturing the sugarcane mill were identified in the surveys conducted in this sector (Figure 5).

Figure 5 It is evident the structural limits of different constructive moments of Engenho Rio de Contas: the portion on the right corresponds to the first constructive moment, and on the left, the expansion, leaning against the pre-existing structure Photo: Carlos Costa, 2007.

Therefore, it is essential to know what those moments were. To this end, the first point to be considered is that the columns of this mill area, now recognized as a milling area, are built without reusing materials, which, in contrast, occurs in the columns of the purging area. Considering this factor, there are strong possibilities of being the oldest area of the sugarcane mill, when there were no materials yet susceptible to reuse. Nonetheless, one element will help us to recognize this periodicity. In this sector – in the survey excavation associated with the southern face of the sugarcane mill, conducted in the interior area of the ruins – the marks of the trench excavated for the construction of the foundations and a small earthfill to level the slope of the land were identified in the stratigraphy. At the edge of this trench and earthfill, in contrast to the sterile (natural) soil, a fragment of Portuguese faience border was collected from a small bowl, with a pattern corresponding to the seventeenth and eighteenth centuries.[35,36] Therefore, we get out of the inferences and have more reliable data about the constructive antecedence of this sector of the sugarcane mill.

Other sectors excavated in the sugarcane mill and that deserve mention are the furnaces. With a size of 12.7 x 5 m, furnace 1 refers to a sequence of furnaces with six whole burners. It is a structured construction with solid bricks made of cast mold and mortar of sand, lime, and yellowish clay. Its format and position are essential elements for understanding the production chain. The furnace is at an intermediate level in relation to the other structures, higher than the purging area and lower than the milling area. Thus, gravity was used as a force for the transfer of the juice extracted from one sector

to another of the sugarcane mill. In addition, the openings of the furnaces are different, the largest and closest to the mill being about 90 cm, reducing in size gradually to the burner farthest from the mill, which is the smallest, with approximately 60 cm (Figure 6).

Figure 6 Furnace 1. Top left, overview. Above to the right, entrance to the combustion chamber with a sugar loaf-shaped fragment. Below to the left, cracks that allowed to intensify the temperature in the larger furnaces. Below to the right, approximate view of the smallest furnace. Photos: Carlos Costa, 2007.

The preparation of cane sugar in sugarcane mills from the 16th to the 19th centuries could be divided into three stages: milling, cooking, and purging.[21] Therefore, the characteristics described relating to the process of production division. In the two larger furnaces, cracks in the bottom of the furnace allowed greater heat intensity in the first pots. With gravity, the sugarcane juice was driven, through a spout, from the mill to the large furnace. As the sugarcane juice became viscous due to the process of water evaporation and solids maintenance; with the use of spoons, the liquid was transferred to the next furnace, of immediately smaller size. With the continuation of the density increase process, the liquid was successively transferred from one furnace to another until it reached the smallest. After this sequence, the product was placed in the sugar loaf molds for decantation.

About this aspect, Carlos Magno Guimarães says that "the great innovation in the kitchen of the sugarcane mills occurred with the development of the 'English train' or 'Jamaican train' furnaces, where the grouping of the pans under a single heat source facilitated its control".[21] Continuing this discussion, Carlos Magno Guimarães, citing Ruy Gama, demonstrates that the Jamaica train allowed at least four innovations to the technological use of the furnaces, which were: the existence of a single fire mouth to meet a set of pans; the use of a single chimney, causing heat to be conducted by all the pans; greater precision in the adjustment of the pans to the holes of the masonry table in which they were supported, reducing heat losses (and, consequently, fuel) through the interstices; and the ease of transferring the juice from one pan to another due to the greater proximity between them.[21]

This technological development of the furnaces occurred parallel to the subdivision, industrialization, and increasing work in the sugarcane mill kitchen. Vera Ferlini (from the comparison of the illustration of Stradanus regarding the manufacture of Sicilian sugar in the sixteenth century and Antonil's descriptions, already in the eighteenth century) demonstrates that this subdivision occurred due to the need to increase productivity since, increased the milling capacity by the adoption of the mesh system, a greater volume of juice should be processed in the kitchen.[21]

In turn, at 2.9 m x 2.6 m, furnace 2 housed only one furnace, which is fragmented. It has a combustion chamber and a chimney. Like the first furnace, it is composed of solid bricks made of cast molds and lime mortar, sand, and yellowish clay. It is in a topographic elevation lower than furnace 1, at the same elevation as the purging area. Next to this furnace, overlapping iron rims were identified, used in wooden barrels. How these rims are overlapped suggests that this container, the barrel, has rotted in the same area where it was left.

Other areas identified were: the water wheel chute; the columns of the aqueduct, which led the water to the water circle; the chute excavated in the ground, which led the water to the aqueduct; and the two dams, which stored the water that fed the sugarcane mill. Due to the position and relationship of the area where the water wheel was located and the aqueduct outlet, it seems that it was a copeiro sugarcane mill[14].

According to Carlos Magno Guimarães and team:

[...] the use of hydraulic energy made possible a greater speed [to the sugarcane mill production], allowing the sugarcane to be totally crushed with only two passages, while in the animal traction sugarcane mills, it was necessary to go through it several times. It allowed the continuous operation of the mill since, in the almanjarras, the animals could work only two hours in a row.[21]

Finally, it is necessary to endorse another context identified during archaeological interventions, which may be associated with the last moment of use of the sugarcane mill. About 50 m from the sugarcane mill, was located a flour furnace made in adobe, with three burners. The total size of this furnace is 5.2 m long, 1.7 m wide, and 0.5 m high, with the burners 0.90 m in diameter. The entrance to the combustion chambers is in the shape of domes, 20 cm high and 40 cm wide. In one of the burners, a roasting edge fragment was identified. Although we cannot establish a direct relationship between this context and the sugarcane mill, the oral information of the children of people who lived in the sugarcane mill indicates that, in the last period of its operation, when the sugar market was no longer as profitable, the owners of this production unit, as well as the owners of other sugarcane mills in the region, started to plant cassava, produce, and sell flour.

The artifactual universe analyzed

To understand the data handled during the preparation of the records, we present the table associated with a graph with the quantities and precise classes of the pieces collected on the site Table 1.

In a more detailed reading of this universe concerning the systemic labor context of Sugarcane Mill, 250 fragments of sugar loaf were cataloged, of which 34 were from the edge. We were surprised by the pieces' size and storage capacity: they indicated containers that supported between 40 and 45 liters. Some parts contain stamps, probably abbreviations of the manufacturers or owners of the sugarcane mill (Figure 7). The walls of the sugar loaf molds are thick, ranging from 0.8 cm to 1.8 cm. The sugar loaf molds were indispensable in the sugar production process since they were the stage of crystallization/ decantation of molasses.

[14]Copeiros are the sugarcane mills in which the water wheel moves through the fall of water on the highest hubs. In turn, crawlers, or meio-copeiros, are the sugar-cane mills in which the wheel receives water through the middle and below the axle. The trapiche sugarcane mills correspond to those of almanjarra, of animal traction.

Table 1 Unique table and graph: Artifactual universe analyzed. Key: button (BU), simple ceramic (C), glazed ceramic (GC), stud (ST), iron (IR), thin faience (TF), Portuguese faience (PF), flagstone (FS), metal (M), tile (TI), brick (BR), glass (GL)

MATERIALS	CLASS OF THE PIECES											TOTAL
	BU	C	GC	ST	IR	TF	PF	FS	M	TI	BR	GL	
SUBTOTAL	3	617	39	34	189	90	1	1	9	10	5	88	1086

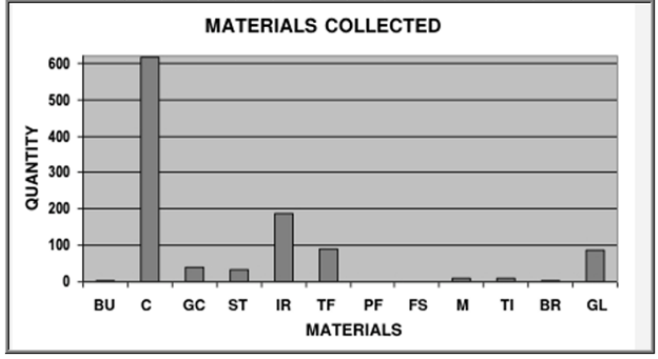

Figure 7 Stamps applied to fragments of sugar loaf molds. On the left, stamp "PHL" (piece: ER.422). To the left, stamp "P" (piece: ER.231). Photos: Fabiana Comerlato, 2007.

As we saw in the documentation of the Martins Lima family, the sugar loaf molds constituted a significant part of the equipment of the sugarcane mills, to the point of being quantified and recorded in the inventories, which is why they were so crucial to the point of being marked, for family division and production control.

Regarding ceramics for domestic use, the number of fragments found was proportionally lower than the production objects. This condition was expected since the archaeological contexts described indicate a production area. Mostly, they are thin faience, undecorated ceramics, and glazed ceramics on the inner face. Unturned decorative ceramics feature some pieces with a smoothed surface.

Thin faience corresponded to half of the exhumed ceramic home use universe. Most of it is composed of freehand painted and hand-painted pieces, associated with figures stamped with floral motif (peasant) and stripes and friezes and their variations. Two pieces have brands of foreign manufacturers, one factory in the Netherlands at the end of the nineteenth century and the other in England, around 1890+. As for the molds, we could identify the presence of shallow and deep dishes, concave containers, cups, and saucers.

Glassy fragments relate to the containment of beverages, especially bottles made from the blowing technique, ranging from light green to dark green. They were probably used to store molasses, sugarcane brandy, and wine. The bottles have specimens of different sizes and colors, with the diameter of the base varying from 6 cm to 8 cm. In addition to cylindrical objects, there were also some vials and cups with faceted walls.

A special highlight to a bottle with a seal named "André Lopez de Castro" would be used for water storage in England, which was falsified in Portugal in the late eighteenth and early nineteenth centuries (Figure 8). According to Augusto D'Esaguy, the water from England was originally manufactured in London, in the fourth quarter of the 17th century, because of the cooking of the bark of Quinine (*Cinchona officinalis*), a South American shrub known in Peru for its medicinal properties for the treatment of sezonism and other infectious diseases. The supposed original recipe for water from England corresponds to a legacy to the compounding teams and families, passed on by Fernando Mendes (to whom the first compounding is attributed) to his disciples, Dr. Jacob de Castro Sarmento and Father Alexandre Botelho. From then on, Dr. Jacob de Castro Sarmento taught the recipe to his wife and son, Henrique de Castro Sarmento, both residents in London. Due to its medicinal properties, water from England was very popular in Portugal, so it was very falsified and commercialized. It is attributed to the captain "André Lopez de Castro", nephew of Dr. Jacob de Castro Sarmento, the first forgery of water from England in Portugal, whose recipe the captain learned in an internship in London.[37]

Figure 8 Cylindrical bottle with seal attached at shoulder height, with the inscriptions "André Lopez de Castro". Piece: ER.1041. Photo: Fabiana Comerlato, 2007.

From the news obtained until the end of this text, in addition to this copy identified on the Engenho Conceição site, a bottle was found by a collector (Daury de Paula Júnior) in Chapada Diamantina, Bahia; and another in the excavations of Rua do Ouvidor, downtown Rio de Janeiro, which demonstrates the good circulation of this counterfeit product in the Brazilian territory. In Portugal, some fragments of these bottles were found in museums and archaeological excavations, questioning the origin of their manufacture, whether Portuguese or English.[38]

The metal parts are mostly made of iron, with few copies of copper and other materials. Due to their precarious conservation, 81% of the pieces could not be identified, as they are limited to pieces of metal without the possibility of interpretation. In the identifiable universe, it was possible to recognize the presence of studs (12%) and other items of varied use: hinge, nail, machine parts, nut and bolt, holder, knife, clamp, and handle.

Conclusion

The Engenho Conceição site represents an important episode of commercial occupation of Bahia territory, occurring from the second half of the eighteenth century to the beginning of the twentieth century. On the one hand, it testifies to the appropriation of the territory in the European molds and, on the other, presents a strong adaptation to the conditions identified in the region. To clarify the spatial context of insertion of the Engenho Conceição site, it is worth briefly reporting

two other excavated sites – Sete Estrelas and Jeribucaçu –, which allow articulating an understanding of the use of this territory and establishing a link to the conceptual notion of "sugarcane mill", addressed here.

At Sete Estrelas site, a likely rural residence 6 km from the sugarcane mill, sectors were identified indicating housing and work activities (flour house, possibly intended for a small local subsistence production). The archaeological materials analyzed in the laboratory, in comparison with the data obtained in the field, suggest that it is a housing unit that existed between the second and third quarters of the nineteenth century[15], whose residents had low purchasing power, so they lived isolated and distant from the urban center.[39]

In turn, the site called Jeribucaçu is a medium-sized, rural residence, with just over 200m², also from the second and third quarters of the nineteenth century.[39] Despite being a rural residence, its location was on the productive axis of the region of Rio de Contas, specifically in the basin of this river, since it is close to the main sugarcane mills, such as Engenho Conceição, which is 1 km from this area. The apparent short distance of 1 km does not allow situating this house as part of the context of the sugarcane mill to apprehend it in the classic concept of Gilberto Freyre. This is because the Jeribucaçu site is on the opposite bank of the river (which is deep, wide, flowing, and navigable by up to medium-sized vessels) and does not have visualization and visibility relations with the sugarcane mill because the top of the river valley covers it.

If it is not possible to situate the mill and the wealthier residence as members of the same systemic context, the location of the house demonstrates, at least, that its owner was strategically installed, placing himself in a privileged way in relation to the trade and circulation of local goods, whose main roads by land passed close to the residence. In it, four rooms were identified, one of which may refer to the kitchen area. The analysis of archaeological materials indicates that it is an owner with more purchasing power than the residents of Sete Estrelas, given that the architectural design of the building, as well as the consumption pattern of mobile materials, are higher.[39]

The fact that the occupations of the Sete Estrelas and Jeribucaçu sites occurred synchronously allows us to understand a particular situation in this area, as the comparison between the two excavated residential units reveals, without a doubt, the socio-spatial segregation that occurred in this sector of the Lower South of Bahia. The most modest residence, the Sete Estrelas site, is far from the decision-making areas of Itacaré, without the possibility of easy access to goods, services, and information. Meanwhile, the wealthiest residence, the Jeribucaçu site, is installed at a strategic point of passage through the local trade routes, with a privileged view of the bed of Rio de Contas, allowing access and control of information and services, as well as ease of arrival, by land and water, to the commercial center of that region, Itacaré. Therefore, it reflects the same mechanisms of concentric spatial segregation identified in Brazil since the colonial period.

In this context, the Engenho Rio de Contas or Engenho Conceição de Boa Vista site was in the middle, on the riverbed. Owned by the Martins de Lima family, it refers to a large sugar production unit powered by water, called in the literature of the area as "royal sugarcane mill". The archaeological data allow us to point out a great period of use of the sugarcane mill, which started between the seventeenth and eighteenth centuries when it had a conformation; in the nineteenth century, it underwent a great expansion intending to increase productivity. The existence of an English train-type furnace with interspersed furnaces demonstrates the need for the subdivision of the work activity, which promoted a significant increase in sugar production. Likewise, the use of large sugar loaf molds with production control (which is concluded considering the presence of stamped marks on these pots) demonstrates a certain distance from production with handmade characteristics and approximation of large-scale production mechanisms.

In turn, the outflow of this production was facilitated by the fact that the sugarcane mill was located on the close margin of Rio de Contas, which allowed the shipment of the goods to Itacaré, the commercial center of the region. In this mill, it was possible to locate all the different functional sectors: dams, gutter, aqueduct, water wheel area, milling area, purging area, nine furnaces, and a natural port, in addition to a flour oven with three furnaces. In contrast, neither the archaeological survey nor the primary historical data make it possible to report any housing or religious unit in the vicinity, let alone slave quarters.

The data presented allow us to conclude that, in the nineteenth century, when the sugarcane mill was significantly expanded, there was a productive peak of sugar intended for import; this peak was verified in the archaeological fact, expressed in the production equipment (interspersed furnaces and large sugar loaf molds) and the architecture of the sugarcane mill. This productive peak was followed by a sharp decline at the end of the nineteenth century and the beginning of the twentieth century, most likely due to the end of the slave period, which provided cheap labor. Faced with this new reality, the owners were forced to vary their goods to meet local demands, which imposed the need to produce other foodstuffs for regional marketing, such as flour.

The fact that it was a unit that brought together different interests – some people traded, people who produced, and people who owned the property and only earned profits from this space (like the heirs of the Martins de Lima family) – allowed that, in the spaces of sugarcane mill, several social actors could be found, who lived different interests and participations in this scenario. For example, we can think of the people who participated in the mechanisms of control and local commerce, such as the residents of Jeribucaçu; or the workers needed and distant from the decision-making centers, such as those of the Sete Estrelas site. That is, we are talking about a spatial relationship with the expanded landscape, a relationship that, therefore, was not restricted to the production unit.

We conclude that the model adopted for the spatial occupation of this productive system identified in Rio de Contas does not allow it to be framed to the concentrated socio-spatial model or the mechanical model of the sugarcane mill. Differently from this, it is a production model and diffuse territorial control since it held a large slice of the territory. The residential units were distant from the productive space, but without losing sight of a relationship of access and control of the landscape, the possibilities of production routes, and the relationship with the urban environment.

Thus, taking as a parameter the driving force, the distribution of the units of the production area, the possibilities of product outflow, and the social landscape of the region, besides perceiving the distance from other sociability units verified in these contexts (such as the

[15]It is important to state that large-scale flour production in the region corresponds to the final moment and even after the productive peak of sugar. The information from local residents (grandchildren and great-grandchildren of people who worked in the sugarcane mill) makes it possible to understand the decline in sugar production and the rise in flour production in the post-abolition period, besides indicating the furnace located near the Engenho Rio de Contas site (identified in archaeological works) as evidence to this process.

big house, the slave quarters, the chapel, etc.), we can affirm that the notion of sugar mill took another form in the Lower South, specifically in Rio de Contas. The production unit had its function accentuated to the maximum, and the networks of relationship with the other social units were diffuse, distributed in the different contexts of the territory, and not necessarily intertwined with the production unit.[40–60]

Acknowledgments

None.

Conflicts of interests

Author declares there are no conflicts of interests.

Funding

None.

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Citation: Costa CAS, Comerlato F, Cunha CS. Archaeology of the lower South of Bahia: engenho rio de contas, Itacaré, Bahia, Brazil. *J His Arch & Anthropol Sci.* 2023;8(3):181–191. DOI: 10.15406/jhaas.2023.08.00291