Towards an archaeology of rubber

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Abstract

This article aims to address the impacts of rubber via historical and contemporary archaeology of the Amazon. Through an "archaeology of rubber" a notion of modernity is examined here. From the creation of rubber gloves to snow boots and tires, rubber has allowed humans to expand their interactions with the environment. As these interactions expanded, the consolidation of the Industrial Revolution and Occidentalism entangled actors in a complex web of meanings, becomings and agencies in opposition to local knowledge. Through a plural and multispecies approach, this article places the study of rubber's materiality in the field of the archaeology of capitalism and modernity. Also, through oral history, deep archival research and public archaeology, local ontologies and materialities offer contemporary archaeology a more elastic view, aimed at widening perceptions of a global story.

Resumo

Esse artigo tem como objetivo abordar os impactos da borracha sobre a arqueologia histórica e contemporânea na Amazônia. Através de uma "arqueologia da borracha" aqui é escavada uma noção de modernidade. Desde a criação das luvas de borracha, as botas para neve aos pneus, a borracha permitiu ao ser humano expandir suas interações com o meio ambiente. À medida que essas interações foram se expandindo, a consolidação da revolução industrial e do ocidentalismo emaranhou atores e uma complexa teia de significados, devires e agências em oposição ao conhecimento local. Por meio de uma abordagem plural e multiespecífica, este artigo situa o estudo da materialidade da borracha no campo da arqueologia do capitalismo e da modernidade. E ainda, por meio da história oral, da densa pesquisa em arquivo e da arqueologia pública, as ontologias e materialidades locais oferecem à arqueologia contemporânea uma visão mais elástica, voltada para suas percepções de uma história global.

A growing interdisciplinary field incorporating ecology and ethnobotanical studies has been analysing the dynamics of the Amazon rainforest, correlating archaeological sites, plant domestications, and anthropic changes that took place in such paleoenvironments. Following this approach, the Amazon is now perceived as a product of human and non-human interactions over time (Levis *et al.* 2018). Paleoenvironmental reconstructions show how variations in forest management and techniques have changed the Phyto physiognomy of the Amazon biome over time. In the recent past, one particular historical event stands out: the rubber boom (Maezumi *et al.* 2018). The rubber tree (*Hevea brasiliensis*) has been responsible for a series of changes, both from local to regional and global, and vice versa from global to local.

In order to understand the relationship between plants and power, it is important to remember that colonialism and imperialism are not only concerned with the conquest of space or territory, but also with the conquest (coloniality) of time such as through the cancellation or subordination of local histories (Shepherd, 2016). In this sense, one can argue that botanical colonialism contributed to the expansion of imperial power. The leading role of Kew Gardens (the Royal Botanical Garden in London) on this imperial expansion is best exemplified through the case of *H. brasiliensis* seeds (Brockway, 1982). The British Empire researched plants for viable economic exploitation all around the globe, including *H. brasiliensis,* which produces natural rubber. Therefore, the study of botanical colonialism is necessary to understand an archaeology of rubber.

The Amazon was well known to European travellers and naturalists of the 19th century. Henry Walter Bates arrived in the State of Pará (Brazil) in 1848; over the course of his journey, he encountered the city of Santarém, which he called the most developed place between Peru and the Atlantic at the time (BATES, 1863). By 1860, James Wells Champney, an American artist and illustrator, had travelled around Brazil as part of the naturalist Herbert Huntington Smith's crew. Champney portrayed scenes of the everyday in the 19th-century Amazon. In Champney's illustrations, rubber played an important role; two drawings are presented here to illustrate the presence of rubber in Santarém and the practice of rubber extraction in the middle of the 19th century (Fig. 1-2).

By 1876, Sir Henry Alexander Wickham shipped seventy thousand rubber seeds from Brazil to Kew Gardens and, from there, rubber seedlings were taken to the Asian British colonies to grow on plantations (Jackson, 2011). Wickham (1873), writing a letter to the director of Kew Gardens, Joseph Dalton Hooker, highlights the potential of exploiting *Hevea*

spp. rubber, and indicates the "bleeding" method of latex extraction[1]. In the same letter, Wickham also offers his services to the Royal Botanical Garden to ship an undetermined quantity of high-quality Amazonian rubber seeds from Santarém, Pará State, Brazil (Fig. 3).

In the Amazon, the quest for native rubber trees and their seeds intensified. By the middle of the 19th century, certain areas, such as the village of Boim (Tapajós-Arapiuns Extractive Reserve, Santarém, Pará State), already stood out for their regional trade (Cohen, 1985). As time went by and rubber exploitation boomed, rubber trees started to be cultivated in the Amazon as well. Not only did rubber cultivation increase exponentially, but following the Great Drought of 1877 in Northeastern Brazil, internal migrations provided ample reserves of labour to work the "syringe"[2], known at the time as "black gold" (Daou, 2004).

Fig. 1: "Making rubber" and everyday life scenes on the edge of Santarém, Pará State, Brazil (CHAMPNEY, 1860). Highlight surrounding a rubber ball.

1 To "bleed" (sangrar) the rubber tree is a local phrase in the Brazilian Amazon that refers to "tapping rubber".
2 "Syringe" (seringa) is the local name of the rubber tree in the Brazilian Amazon.

Fig. 2 Extraction of latex. The use of axes, shells of Brazil nuts to collect the latex and a traditional *jamanxim* basket drive attention here (Champney, 1860).

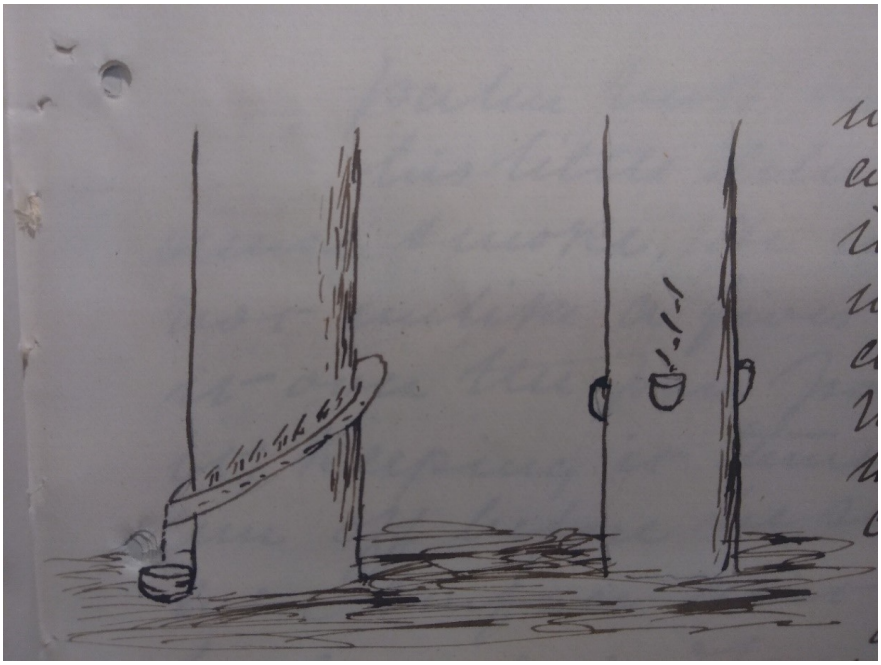

Fig. 3: Latex extraction scheme following two models; left: the use of *caraná* palm covered with clay embracing the rubber tree; right: the use of traps from shells of Brazil nuts (Wickham, 1873).

Migrations from the Northeast increased the northern region's population and transformed its density and landscape as the cultivated rubber forests spread. However, the Brazilian rubber economy entered into decline due to the growth of the Asian market, which originated from rubber seeds taken from Santarém. By the turn of the 20th century, the rubber boom was collapsing, reaching its definitive bust by 1920 (Muniz, 2019; Weinstein, 1993). This article aims to draw the attention of historical and contemporary archaeologists to an archaeology of the rubber boom and its variety of approaches to historical ecology, internal migrations, anthropology of techniques, material/immaterial/toxic heritage, and coloniality/modernity, related to rubber production.

In the following section of the text, I demonstrate that the changes brought about by rubber were multidirectional. I trace links between local seeds, regional migrations, and global exploitation, as well as the connections between rubber-making techniques, the rubber economy's labour system globally, and the introduction of new practices in the Amazon region.

Techniques and transformations: global-local rubber feedback

The development of different techniques and materials associated with rubber extraction increased the efficiency of its production. Meetings and presentations on rubber were held at annual exhibitions and conferences to show new knife models (Fig. 4) and guides to good practices for cultivation and latex collection, therefore stimulating the development of the research and industry of promoting rubber trees' productivity and health. New technologies and techniques were also developed; gradually, such innovations started to be introduced to Amazonian plantations, where the use of knives replaced axes.

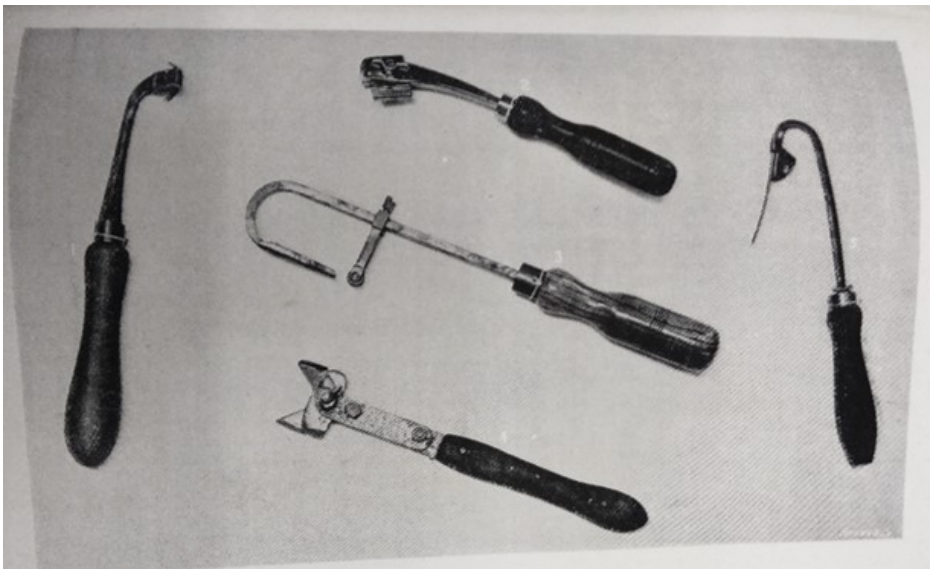

Fig. 4: Different knife designs made for latex extraction, 1906 Rubber Congress (Willis, 1906).

However, new knives, different types of cuts, and the use of vegetable oils for faster bark regeneration were developed for greater efficiency in Asian rubber tree plantations (Loadman, 2006). In 1911, Jacques Huber, at the time director of the Museu Paraense Emílio Goeldi, created and patented the Huber knife, aiming to increase the productivity and longevity of the trees (Sanjad, Castro, 2016). Following the creation of such items and the associated knowledge developed for rubber production, the introduction of new techniques and technologies took place worldwide. In this global-local perspective, the rubber knives that were developed for rubber production in British colonies re-conquered the Amazon through the dissemination of the "fishtail" cut, which became the most used method in the Amazon (Fig. 5). As such, the landscape and forests in the Amazon began to be transformed, not only by the growth of rubber plantations trying to meet international demand, but also by ways of making rubber, with the arrival of these new techniques to "bleed" the rubber trees.

Fig. 5: Rubber tapper Mr. João making a fishtail cut at the Seringal Veneza, Boim, Santarém, Pará State. Photo: author.

Sociotechnical adaptations in contemporary rubber plantations have been the subject of a recent doctoral dissertation in anthropology which argues that the material culture involved in tapping nowadays is constantly transformed by the rubber tappers' agency and available resources (Deus, 2017). From a historical point of view, it is noteworthy that the importation of new technologies and techniques came to suppress local knowledge. Although, and as Sanjad and Castro (2016) point out, in 1911 Jacques Huber stated that a "simple rubber tapper from Portel" (Marajó Island, Pará State) had created a totally new method for vulcanizing rubber[3] which attracted scientific and commercial attention during Brazil's rubber exhibition, the technique never took off.

It is also noteworthy that by the beginning of the 20th century, Brazil had seen many attempts to find a new method or technique to optimize production and prevent the eventual decay of the rubber economy. Doctor Carlos de Cerqueira Pinto observed the harmful effects of toxic gases produced by the rubber smoking process and, in 1908, patented a latex coagulation method with the purpose of preserving the elastic properties of rubber and the health of the rubber tapper. This method also failed to replace natural rubber smoking techniques, which relied on palm fruits (Sanjad, Castro, 2016).

3 Rubber vulcanization is the process of hardening rubber by the addition of sulphur.

In rubber tapping communities, different discourses on efficacy, care, and expertise when handling rubber trees are mixed with memory, which may reveal a sociotechnical adequacy and transfer of technologies in a hierarchical direction; or a record of 'nostalgia', as verified by the genetic narrative – of a positive past and negative present (Rüsen, 2004). Oliveira Filho addresses the existence of two models of rubber plantations in Brazil, the *barracão system* (or *apogee system*), and the *caboclo system* (Muniz, 2019, Oliveira Filho, 1979). The *caboclo* rubber plantation system was associated with traditional practices, while the *apogee* rubber plantation system refers to an increase in work and intensity – during the apogee, certain rubber plantations were reported for situations analogous to slavery.[4]

Indeed, it is important to situate rubber heritage within its various layers, amidst its materials, its immateriality, and even in its sensitive and complex dimensions. The dimension of toxicity within rubber heritage itself has several aspects; as mentioned above, the rubber smoking technique produces polymers, which, when inhaled, are harmful to health and in some cases can lead to blindness. Other relevant dimensions include the silenced indigenous presence in the vicinity of the barracks; the labour conditions often analogous to modern slavery; and the various tensions with regards to race and gender in rubber plantations, as can be seen in various recent reports (Alves, Pinto, et al., 2018, Blanco, Bambirra, 2017, Brito, 2018, Lage, 2010). Finally, it should be noted that the installation of rubber plantations in Northern Brazil was also intended to support territorial expansion, extending the relations of coloniality, by reproducing what can also be defined as "seringality"[5] (Souza, 2017).

The rubber boom is the most studied historical period of the Amazon; its intense exploration and richness forged local elites and reinforced exploitation models with aspirations toward "Parisian modernity" and the arts. The next section presents how rubber reproduced colonial/imperial relations in order to foster industry.

[4] Roger Casement, an Irishman who acted as the consul of Grão-Pará, was internationally recognized for his work on the extraction of latex in the Congo and in Putumayo (Peru, present-day Colombia), denouncing a series of crimes against humanity arising from relations of exploitation in rubber plantations (Reilly, 2017). Even though Brazil's Amazonian rubber tappers were "socially free", they were slaves to financial debts, isolation, loneliness, and routine (Martinello, 2004).

[5] Freely translated from the Portuguese *seringalidade*, which could also be translated as "rubberity", in allusion to the rubber boom and the colonial relations maintained in rubber exploitation systems.

Amazonian *belle époque* for whom?

> What in the lexicon of Cultural History was configured as belle époque indicates a complex process of cultural, social, and mental relations, but also material and political, developed within a corpus recognized historically as that of bourgeois culture and its affirmation within the hegemonic frameworks of industrial capitalism at the end of the 19th century. (...) The belle époque, understood as a manifestation of the Golden Age of the urban culture of the contemporary bourgeoisie, and whose traditional paintings, as seen, refer to Paris in the late 19th and early 20th centuries, has always been a visited domain in the Brazilian social narrative. The urban transformations of cities like Belém and Rio de Janeiro in the same period were treated as specular dimensions of the Parisian matrix, belle époque, in the social and mental latitudes of the Brazilian tropics (Coelho, 2011). Translated by the author.

Forged through the work on rubber trees, the rubber economy subsidized the rising bourgeois class's ideas for socially sanitizing and (re)building the largest Amazonian cities in order to pursue Parisian aesthetics and arts in the tropics. Between 1910 and 1920, the elite of Belém (Pará State) attended *chás-dansantes*[6], cinemas, and theaters, parading ostentatious clothes while the majority of the population was subordinated to the structural problems and tribulations of economic crisis (Martins Júnior, 2010). In 1910 the imposition of modern life was also prominent in Manaus (the State of Amazonas), where the traditional practice of using straw to cover houses was considered "unhealthy and ugly". The pursuit of "sanitary" practices and the suppression of "vulgarity" meant that houses with separate rooms became the local norm. Equally, Western clothing came to represent the forces of modernity on the Amerindian nude, pushing towards the acceptance of modernity (Santos Júnior, 2013).

In rubber trees and barracks, the characteristic smell of rubber and its processing stand out; in historical reports about the rubber boom in the Amazon, fetid smells are also mentioned. The fact is that, in addition to producing a peculiar scent, the chemistry of rubber can also be harmful to health; especially for the method of smoking rubber with palm seeds, the inhalation of polymers in smoke is extremely harmful. Ergo, such toxicity was heavily present during the rubber boom, or in the *caboclo system* (Fig. 6).

6 Old Portuguese word cited commonly in newspapers from the beginning of 20th century, refering to a type of afternoon ball also known as a tea dances.

Fig. 6: Process of making rubber balls by the method of smoking rubber latex with charcoal from palm seeds during the beginning of the rubber boom (ULE, 1908).

Another example of struggle in working with the toxicity of rubber is the claim for additional wages between the decades of 1950 and 1980. The agenda, led by tyre repairers, was a reaction against the thermal sensation and odours that came from the vulcanization of rubber and required palliative action. According to the workers, it was necessary "to be manly" to withstand the noise, heat, dispersion of dust and chemicals in the air, and the bad smell (Rezende, 2013). Therefore, insalubrity, work, gender, and also race merge here in the working class that continued to produce goods and add value to rubber.

In the meantime, local Amazonian knowledge pointed to new recipes using plants and local ingredients to accelerate the process of "curdling milk"[7] from the rubber tree (Muniz, 2019). This was not credited as being scientific nor was its effectiveness recognized, as it was instead suppressed by vulcanization patents (Hills, 1971) and the coloniality of knowledge (Lander, 2005). Therefore, there is a tangle of knowledge, materials, and worlds that flow between the *caboclo*, indigenous, black, "ribeirinho", Jewish and other forms of knowledge in the context of rubber in the Amazon, in which minorities have been put aside and forgotten as a response to the formation of colonial difference.

[7] Local category for coagulating rubber, from Portuguese: coalhar.

Rubber agencies and actants against "modernity"

A notable case about rubber in the Brazilian Amazon involved another 'Henry'. Like Henry Wickham, Henry Ford also had certain expectations for acquiring rubber from Brazil. After the collapse of the rubber boom in Brazil (1850-1920), Henry Ford tried to create a metropolis in the tropics by establishing a rubber plantation and a planned American city in the Lower Amazon, named after himself: Fordlândia. However, this American dream never came true. Fungi and tropical diseases soon began to curb Ford's plans; Fordlândia (1928-1945) flopped and was abandoned (Fig. 7). Nowadays, Fordlândia is commonly cited as a "ghost town"[8].

Fig. 7: *Hevea brasiliensis* plantation at Fordlândia (Pará State, Brazil). Highlight: the short distance between the rubber seedlings on the plantation, which possibly made the growth of the trees unfeasible and contributed to the proliferation of the fungus (leaf blight). Source: The Henry Ford.

[8] More info: www.theguardian.com/cities/2016/aug/19/lost-cities-10-fordlandia-failure-henry-ford-amazon. Accessed on 2 Mar 2021.

Discussing the rubber boom encompasses signatures of human agencies - and actants, as Latour would say - without mistakenly essentializing or purifying categories of "nature" and "society" (Latour, 1994). The term actant designates a non-human actor or non-individual entity and can be literally anything in action in the actor-network complex (Latour, 2017). This context, in which the fungus becomes entangled with trees and humans and disrupts the development of an American metropolis in the Amazon, brings up the debate about the agencies and actors that produced modernity. In this sense, studies of contemporary archaeology could encompass a variety of topics or sub-fields within archaeology of modernity, archaeology of capitalism, archaeology of industry, the Second World War, colonialism, imperialism, the rubber plantation, archaeology of/in the present, etc.

The most enthusiastic would say that it is impossible to imagine the "modern world" without rubber. The items produced from rubber latex have amplified human activity, enabling - through asepsis and globalization - the expansion of interactions between body and environment. Items such as gloves, tyres, and medical/industrial materials have transformed society. Rubber was used to make snow boots, which improved human capacity during the winter; rubber gloves were developed for medical use, to avoid contamination; rubber tyres expanded zones of human activity with the advent of cars and planes worldwide; and, industrial items made of rubber helped to consolidate the second Industrial Revolution.

Yet, still according to Latour (1994), in order for something "modern" to exist, it is necessary to create a rupture between the "old" and the "modern" with disruptive asymmetry. Therefore, Latour advocates that since there has been no abrupt change, we have in fact never been modern. In the relationship between humans and other organisms and tools, "human" acquires a sense of the product of relationalities, temporalities, and materialities, conceptualizing a multispecies, or even questioning whether we were ever human (Gane, Haraway, 2010). In this challenge of building a more than human anthropology, the notion of "substantive biologies" emerges, where multispecies symbiosis and mutualism also refer to anthropology (Tsing, 2019). Such a substantive biology points to how organisms emerge from relationships, thus highlighting that we have never been individuals, either (Gilbert, Sapp, et al., 2012).

Actants such as the fungus that put an end to the American dream of a metropolis in the Amazon point to yet another layer of rubber entanglements: the multispecies approach. *Microcyclysulei,* the fungus known as "leaf blight", is responsible for thwarting the huge

plantations of rubber trees sought by the Ford Motor Company in the Lower Amazon. However, the dispersion of this fungus is restricted to the American continent, which is also one of the factors that contributed to the successful implementation of rubber plantations in Asian British colonies.

In this context, social relations in rubber plantations like Fordlândia raise the debate about the industrial and material heritage of rubber[9]. Thus, Fordlândia could be considered an industrial heritage of rubber; however, in this heritage complex, the factory is just the tip of the iceberg, as it was in the woods that the toil to "bleed" the "syringe" and produce the so-coveted "black gold" occurred. In this sense, the highlight here is an amalgamation of knowledge (Muniz, 2019) and historical materials (Muniz, 2020) associated with the rubber extraction and production process, which could be also understood as part of this heritage complex. Next, in this context of an emerging present, I demonstrated how contemporary archaeology dialogues with these materialities as an archaeology of the present.

Emerging present of seeds of wealth

The "archaeology of the contemporary past" is a field that argues for the greater integration of historical archaeology and its expansion through social, political, economic, and ecological concerns toward emerging futures and pasts (Harrison, Cabral, 2019). Thus, the archaeology of the contemporary is a field which has discussed both the objects of the past in the present and the contemporary itself, as one of the fields of archaeology - understood here as the science of materiality studies. Aanother way of thinking about archaeologyis the way that it works with local communities to investigate everyday life, its entanglements, things and landscapes, advocating that ethnoarchaeology should be remodelled along the lines of the archaeology of the present (González-Ruibal, 2006).

An archaeology without time limits, multitemporal, participatory and public, political, creative, with its own rhetoric, which claims materiality on an equal ground among other sciences, also has a global and essentially theoretical characteristic: these are some of the critical elements for making the discipline more scientifically and socially relevant (González-Ruibal, 2012). In the same way that there are different engagements of archaeology with the present, not only are there are several pasts that different archaeologies produce, but several possible futures (Harrison, Cabral, 2019). In this way, heritage can be understood as practices that create futures (Harrison, Desilvey, et al., 2020).

[9] Fordlândia has an ongoing process for heritage registration in Brazil, which was initiated in 1990.

Here, theory, practice, and socially relevant knowledge meet in the study of new materialisms and immaterialities, while research is conducted to understand the relations of/in/for/by local communities towards decolonizing archaeology (Atalay, 2008, Silliman, 2008). There is, therefore, a need to create an archaeology of coloniality/modernity, expanding the public engagement of the discipline. In this sense, this article argues for a more elastic archaeology, both when looking at its own field of study (following this interdisciplinary current of contemporary archaeology), as well as in its own relationship with local communities and local knowledge, with the purpose of also incorporating oral history and other tools that enable a better understanding of materialities in relation to traditional peoples.

Rubber is one of the four seeds that has had a deep effect on socioeconomic relations across the planet, creating wealth and elites through its exploitation, along with those of wood, wine grapes, and tobacco (Hobhouse, 2004). In this context, addressing the industrial heritage of the rubber boom in addition to the factory machinery and its materiality also directs the focus to people and their relationships. Also, understanding the context of botanical colonialism, the acquisition of rubber seeds in the Amazon and the abandonment of towns and people is part of understanding the relationships that coloniality established when creating the West and modernity. And finally, approaching the archaeological field to study oral history, memory and heritage is also to open new perspectives on materialities and entanglements, and even contributes to the further dissemination of archaeology as a popular science with local peoples.

Conclusion

It is worth pointing out that archaeology in the Amazon has focused more on studies of its pre-colonial component, which has been researched for the last 200 years (Costa, 2017, Gomes, 2020). However, historical archaeology in the Amazon began effectively only in the 1980s, with an emphasis on research developed in military, religious, urban, and rural contexts (Costa, 2017). More recently, the extraversion of archaeological materials (pre-colonial and colonial) found in communities in the Amazon has been the subject of research in public archaeology and heritage education with communities that live in the vicinity of such archaeological sites (Bezerra, 2011, 2012).

This article points to the need for further archaeological studies on colonial differences and materialities in the Amazon. The rubber boom is the most studied Amazonian period in terms of historiography. Not only was the rubber boom of paramount

importance for the social transformations that occurred in the region, but so too were the cycles of cocoa and pepper exploitation, among other *drogas do sertão*[10]. In this way, both the approaches of historical archaeology and the archaeology of this contemporary past, emerging presents and heritage futures, aim to understand aspects of remaining/changing materiality/immateriality. Therefore, the archaeology of the gomiferous economy can help to expand a series of analyses of the history and contemporary present of the Amazon. From such an approach, the archaeology of the rubber period can relate to other subfields of archaeology and disciplines such as history, anthropology, biology, ecology, chemistry, and many others.

In the Brazilian Amazon, the material heritage associated with the rubber period, in addition to the House of Chico Mendes (Xapuri, Acre), is not yet listed. As mentioned here, Fordlândia has had a listing procedure in progress since 1990, in which the industrial property of the Ford Motor Company is the central object. However, the intangible heritage of rubber still needs further analysis, such as on the modification of the forest itself in order to supply the industry: could such entanglements be considered as part of such an industrial heritage complex? The materiality of rubber, like elastic, would answer such a question: it was through the relationships started in such forests and the elastic properties of materials made from *H. brasiliensis* that humanity expanded/stretched through its interactions, narrowing distances and relationships – even consolidating the Industrial Revolution and, therefore, "modernity".

In the hypothesis that we indeed have never been modern (or even human), it was precisely made possible through rubber's primary role of generating technologies, power, inequalities and entanglements of things, plants, fungi, humans, and non-humans that made us modern humans. Therefore, in studies of rubber materiality, human relations, things, forests, fungi, non-humans, and a multispecies approach should be given more scientific attention. The debate around the Anthropocene, or that around the many other names for this actual period, also falls within the context of this research, since it was natural rubber which heralded an early plastic/synthetic age – reasserting the importance of this research. In this sense, the rubber heritage complex, material and immaterial, aims to understand its relative toxic heritage, other relations in rubber plantations and extraversion of such archaeologies of rubber in an elastic way, with/for/by local communities and in a

[10] The term "backcountry drugs" refers to products exported from colonial Brazil to Europe as spices and medicines, especially during the 17-18th centuries. These products include cocoa, Brazilian nuts, guarana, annatto, vanilla, pepper, cinnamon and clove. Afterwards, during the 19th century, rubber exploitation led the Brazilian economy as its most important good, even more profitable than coffee or sugar.

closer approach to an archaeology which incorporates social relations, is inclusive, public, political and focused on heritage futures and moves towards a critical approach.

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