Luso-Brazilian Enlightenment and the circulation of Caribbean slavery-related knowledge: the establishment of the Brazilian coffee culture from a comparative perspective

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Abstract

The generation of enlightened Luso-Brazilians saw Caribbean slavery agriculture as the model to be emulated in Portuguese America. To do so, at the turn of the eighteenth to the nineteenth century, they translated and published some of texts originally elaborated in the Antilles. In this reformist environment, the coffee culture occupied a place of prominence. To understand the role of this knowledge in establishing the Brazilian coffee culture, the Brazilian case is compared with the Cuban. The intent is to demonstrate that in the Spanish colony, the productive coffee plan of Santo Domingo was implanted, while in Brazil, a plan was created, supported by new standards of agricultural management that were founded on locally knowledge.

Keywords: coffee culture; slavery; Brazil; Cuba; Santo Domingo.

Within the reformist design of Luso-Brazilian enlightenment, which intended to revitalize the Portuguese Imperial economy – notably its American portion – through diversification of the list of exports and an increase in the production of articles already exploited, Caribbean slavery agriculture was taken as the model to be emulated (Galloway, 1979; Marquese, 2004). This attitude can clearly be observed in the choices that led to the composition of the famous collection O Fazendeiro do Brasil (The plantation owner of Brazil), published between 1798 and 1806 by the Minas Gerais botanist Frei José Mariano da Conceição Veloso. Entrusted by Dom Rodrigo de Sousa Coutinho, Secretary of State of the Navy and the Overseas Dominions (Marinha e Domínios Ultramarinos) beginning in 1796, with making available to Brazilian subjects the best writing on the different agricultural products capable of being cultivated in America, Veloso basically had recourse to English and French publications. With few exceptions, the texts that Veloso inserted in O Fazendeiro were translations of works that represented the forefront of slavery-related knowledge – in other words, agronomy techniques, processing machinery and slave management methods – developed in the English and French Caribbean possessions during the eighteenth century.

Coffee occupied a position of prominence in the collection. Of its 11 volumes, two were dedicated exclusively to the product, something that only had an equivalent in sugar and indigo (the others concerned cotton, cocoa, cochineal, spices and cattle raising). The first of them brought a miscellany of texts composed by different authors, who examined coffee production and commerce, both in lands bathed by the Indian Ocean and different colonies of the Atlantic (French Guiana, Santo Domingo and Jamaica). The second volume, in turn, was reserved for a sole work: the manual of Pierre-Joseph Laborie, *The coffee planter of Saint Domingo*, originally published in English only two years before the translation into Portuguese.

In Veloso's evaluation, Laborie's work represented not only the best treatise on coffee, but could also equally serve for other sectors, since "the terms in which it was conceived and executed make it deserving to be chosen as a model worth imitating in all other cultivations of equal size that require such trade in machinery, replacing the word 'coffee' with that of indigo, sugar and machinery, as may be appropriate" (Laborie, 1800, p.VIII; free translation from this edition). As a matter of fact, the Minas botanist's assessment was accurate. During a large part of the nineteenth century, Laborie's manual was known as the great reference work on the subject. In 1866, for example, dealing with the coffee culture in British Ceylon, William Augustus Sabonadière (1875) considered Laborie's manual to be the best piece ever written on the subject.

The event that motivated Laborie to compose his manual was the same as that which drove a considerable part of Dom Rodrigo de Sousa Coutinho's official actions as head of the Secretariat of the Overseas Dominions, as well as the publishing efforts of Frei Veloso: the uprising of the slaves in the French colony of Santo Domingo. If Laborie conceived his text as a sort of 'thank you' for the British invasion of Santo Domingo, looking at the potential of the coffee culture in Jamaica, Dom Rodrigo and Frei Veloso saw it as great opportunity to take advantage of the vacuum in the world market for tropical items caused by the slave revolution. In the specific case of coffee, however, the slaveholder producers of Brazil were tardy in responding to the wager of the bureaucrats and erudite

Luso-Brazilians. In 1800, coffee was well behind sugar, tobacco, cotton and rice on the list of Portuguese American exports (Arruda, 1986). Brazilian coffee culture only began to grow consistently in the 1810s, its true leap forward being seen only in the following decade (Marquese, Tomich, in press).

In light of this information, the question should be formulated: what was the role of the Caribbean slavery-related knowledge transmitted by the erudite Luso-Brazilians in the establishment of the Brazilian coffee culture? It is, without a doubt, a relevant question, but one seldom addressed by specialists. An exception is found in the field of the history of the architecture. Marcos Carrilho (2006), in an innovating work on the coffee plantations at the base of the Paraiba Valley in state of São Paulo, stated that Laborie's manual "was certainly the most important reference work for the development of the Brazilian coffee culture" (p.61)[1], discerning a series of continuities between the precepts of the Santo Domingo author and the practices employed by Brazilian coffee growers (Carrilho, 1994, p.47-48). Similarly, Vladimir Benincasa (2007), in a comprehensive survey of the coffee plantations in the province and state of São Paulo, states that in the 'primordial days' of coffee culture in the Paraiba Valley "the memoirs mentioned for the cultivation of coffee are what overcame the Brazilian plantation owner's lack of familiarity with the coffee tree and the installations needed for its processing. One of the most important coffee culture manuals, which was well disseminated in the Brazilian rural milieu, was the work *O fazendeiro de café da ilha de São Domingos* [*The coffee planter of Saint Domingo*] by P. Laborie" (p.32).

A comparative framework can provide a good way to answer the question, thus evaluating the accuracy of the assertions of historians of the architecture. To do so, the Spanish colony of Cuba represents an ideal case. As with its Luso-Brazilian peers, bureaucrats, erudite Spaniards and the Creole elite presented at the end of the eighteenth century a platform for revitalizing the insular economy, one that took the English and French Caribbean as the model for reform. Besides this, in the specific case of coffee culture, the growth of Cuban production also occurred in the vacuum left by the Santo Domingo Revolution, in other words, at the turn of the eighteenth to the nineteenth century. Nor was Laborie's work long in being translated into Spanish: a version of his manual was published in 1810 in Havana with the title *Cultivo del cafeto* (Laborie, 1820).

I intend to show that the Santo Domingo coffee productive plan was in fact implanted in Cuba as propagated in Laborie's manual, especially by the French refugees who went there after 1791. The Spanish colony represented, as a result, the logical outcome of the plan proposed by Laborie. In Brazil, a new productive plan was created – contrary to what specialists in the history of the architecture state – one tied to new agricultural management standards and based on locally developed knowledge.

In the first part of this article, I present Laborie's model; in the second, I discuss the procedures adopted in Portugal and Cuba in the translation of his manual, the establishment of coffee production in the Spanish colony and the technical pattern of the coffee plantations founded in the dense Tijuca forest after the flight of the royal Portuguese family to Rio de Janeiro. In the last part, I examine the break that the slavery-related coffee culture in the Paraiba Valley represented from the previous Santo Domingo model, and I briefly explore the broader implications of this modification.

Pierre-Joseph Laborie and the Santo Domingo model

The appropriation of the coffee tree by the Western powers depended on the networks formed by the metropolitan acclimation gardens (Beinart, Hugues, 2007, p.24-25). Originally cultivated and commercialized only by the Arabs, coffee had by the seventeenth century already become the target of European colonial interests, which, through institutions such as the Botanical Garden of Amsterdam and the Plant Garden of Paris, succeeded in learning the secrets of the bush, successfully transplanting it to their overseas possessions (Martins, 2008, p.26-27). In the first decades of the eighteenth century, the Dutch colonies of Java and Surinam and French Martinique took off as large producers, capable of meeting a considerable part of metropolitan demand. The jump in European production, however, only came with the progress made by coffee in the French colony of Santo Domingo verified after the Seven Years War (1755-1763). In the 1740s, the French and Dutch produced in those colonies some 6,000 metric tons annually (Samper, Fernando, 2003, p.412; May, 1972). The exports of Santo Domingo, in turn, jumped from the level of some 3,100 tons in 1755 to close to 32 thousand tons in 1790. At the latter date, the French production in the Antilles and the Indian Ocean (Santo Domingo, Martinique, Guadeloupe, Cayenne and Reunion) totaled about 48 thousand tons, equivalent to some 70% of the world total, estimated at 69,400 tons. As can be seen, on the eve of the revolution, Santo Domingo was responsible for almost half the world production of coffee (González Fernández, 1989, p.154; Trouillot, 1982, p.337).

That was the economic context for preparation of Pierre-Joseph Laborie's manual. Born in Cap François in 1744, Laborie invested in the coffee sector beginning in the decade of the 1770s, standing out as a producer in the parish of Borgne. In the assessment of Moreau de Saint-Méry (1797, v.1, p.680), the coffee obtained in this parish was considered the best in the northern part of the colony. In addition, its conversion into the coffee producing zone was relatively recent: in 1743, the total population of the parish did not exceed 800 people, who produced only indigo for export; on the eve of the revolution, it had 412 whites, 282 freedmen and 5,742 slaves, employed in 117 coffee plantations, compared to only two indigo plantations and no sugar mill.

Concerning the intellectual context, it is not known for certain if Laborie was a member of the Société Royale des Sciences et des Arts du Cap François (better known as the *Cercle des Philadelphes*), but it can be stated that his network of friendships and relationships placed him in close contact with what was discussed there.[2] As the diligent study of James McClellan (1992) demonstrated, in the 1780s, Santo Domingo was not only the richest European slave colony in the New World, but also one of the largest scientific centers in the Western Hemisphere.

The best expression of the scientific advance of Santo Domingo in the Old Regime was precisely the establishment of an institution such as the *Cercle des Philadelphes*. Its central objective was preparing a body of scientific knowledge that would be useful for the colonists, thus contributing to increase the colony's prosperity. The society's program provided for the compilation of information on the natural history and economy of Santo Domingo, the conducting of studies regarding tropical diseases, research on the acclimatization of new vegetable and animal species and investigations into agricultural and manufacturing techniques. In the institution, which enjoyed the active participation of several rural

landowners directly involved in the exploitation of slaves, some of the main texts of slavery-related knowledge of the Atlantic world at the time were prepared: we need only recall the famous 1790 sugar manual of Jacques-François Dutrône or the 1787 treatise on the harvest of cochineal by Thierry de Menonville, both translated to Portuguese by Frei Veloso (Dutrône, 1801; Ferraz, 2007). For our purposes, it is important to highlight that Laborie's manual was in tune with the broadest principles that governed the composition of agronomy works produced by the *Cercle des Philadelphes*.

The beginning of the French Revolution brought Laborie to the forefront of political action. A lawyer by education, he had political experience due to his services as secretary of the Chambre d'Agriculture do Cap François. Being in Paris in 1790, he was named attorney general of the Conseil Supérieur of Cap, and, in the following year, elected deputy to the National Assembly by the northern province. An active member of the proslavery lobby in France (Geggus, 1989, p.1295), when he returned to Santo Domingo, he was one of the many French colonists to support the British invasion of 1793. With the victory of Toussaint L'Ouverture in 1798, he took refuge in Jamaica, where he died two years later. *The coffee planter of Saint Domingo* accurately translated the political preferences of its author. Laborie explained, in the preface, that he offered the work in English as a sign of gratitude for British help to the French slave owners and for it to be useful for Jamaican producers as well, the reading public to whom it was destined, one that at the time was ignorant regarding the secrets of Santo Domingo coffee production (Laborie, 1798, p.IV).[3]

Laborie divided his work into four chapters, which dealt with, respectively, the selection and preparation of the land for planting coffee, the construction and distribution of the buildings, the cultivation and processing of the beans and, finally, the administration of the slaves. (Laborie, 1798). For the purposes of this article, three points should be highlighted. The first refers to the agronomy techniques. By translating the practices effectively employed in Santo Domingo, Laborie appropriated the basic pattern of coffee plantation management created by Europeans in the Indian Ocean at the beginning of the eighteenth century, in other words, planting in line and pruning when the coffee trees reached the height of an adult male, adding to the method the disposition in quincunxes, "whose advantage is to join the rows and, consequently, save land" (Laborie, 1800, p.159; free translation from this edition; see Figure 1).

The spacing pattern propagated by Laborie (1800, p.162), of six ft.^{2} per quincunx, meant about 15,700 bushes per geometric *alqueire* (48,400m^2). For the harvest, Laborie recommended the classic task system (Morgan, 1988). Each slave should collect a given quantity of berries daily, stipulated according to the distance between the coffee planted and the processing installations and the number of workers available for the harvest. As an incentive, free time was given at the end of the job. The practice of strip-picking, with its consequent indiscriminate picking of green and ripe berries, was prohibited to improve the end product (Laborie, 1800, p.217-218).

The second point to highlight is the fact that the harvest system was directly connected with the processing method adopted. The processing of the coffee consisted in the separation of the two involucres that surrounded the seed, the pulp and the parchment. Laborie noted, first, the common practice of improvement "in the cherry stage": after being collected,

the berries were placed to be sun dried on large yards until becoming completely dried and the pulp, easily broken, could be separated from the two coatings and the coffee bean. Nevertheless, this was not the process that he recommended. Given the high amount of Caribbean rainfall, Laborie – according to the practice of well-known coffee cultivators – proposed what was known there as 'preparation in the husk', known in Brazil as 'the wet method'. In this method, the berry pulp was immediately removed after the harvest by a de-pulping machine driven by manual or hydraulic energy (Figure 2). Wrapped only in theparchment, the beans were next washed for 24 hours in tanks with running water, for the double purpose of taking the mucilage from the seeds and separating the ripe beans from the cochos, which rose to the surface in these tanks – these beans, separated from the ripe ones, produced an inferior quality coffee. After washing, the beans in their - parchments were placed in the yard (or drying platforms, the name that was given to them in the French Antilles) until they were completely dry, when they proceeded to the final membrane removal in the de-husking mills (Figure 3), completing the process with the bean selection and bagging (Laborie, 1800, p.67-86).

Finally, the third point refers to the processing method prescribed, which required, to be successful, making the layout of the plantation area adequate. This could be observed, in the first place, in the construction of the yards. The demands of the productive process (removal of the pulp, washing, drying, and removal of the membrane) imposed the correct placement of the yards in the building complex. On inclined land, for example, these would be constructed in amphitheater cuts, following the processing flow. Similarly, the yard should be adjusted to the dimensions of the coffee plantations and the harvest rhythm. "Thus – Laborie clarified – the harvest being longer, less surface is needed." One notes, here, how the organization of the work harmonized to the industrial architecture: in the task system prescribed, the categorical determination to select only ripe berries meant that the same coffee plants would necessarily be harvested several times during the crop season. Laborie (1800, p.118-125) concluded his considerations regarding the yards by offering detailed instructions regarding the raising of retention walls, compacting, soil leveling, inclination, paving, and the construction of circular borders in the center of the yards for conical huts to protect against rain.

The care in the presentation of all of the steps needed to construct and distribute the buildings went farther. The text of the manual was accompanied by – very much in the cognitive style of illustration (Le Bot, 1979, p.54-69) – some prints, which presented architectonic plans of two large Santo Domingo plantation, giving an exact indication of the location of the buildings and, in one of them, the coffee planted, the forest and the pastures as well. It is worth quickly examining these two prints. According to Laborie, symmetry was the principle that should guide the implantation of the property, from both the organization of the fields and their center. To do so, he set forth a habitation plan that he considered a model. As can be seen in Figure 4, the property shown would be divided symmetrically into three parts: (1) the coffee planted, located to the left; (2) the forest reserves, to the right; and (3) the habitation center, containing the processing installations and housing (A), land for cultivating artificial pasture grounds (B), provisions (C), banana plants (D), pastures (G), and cleared land for the slaves themselves (F).

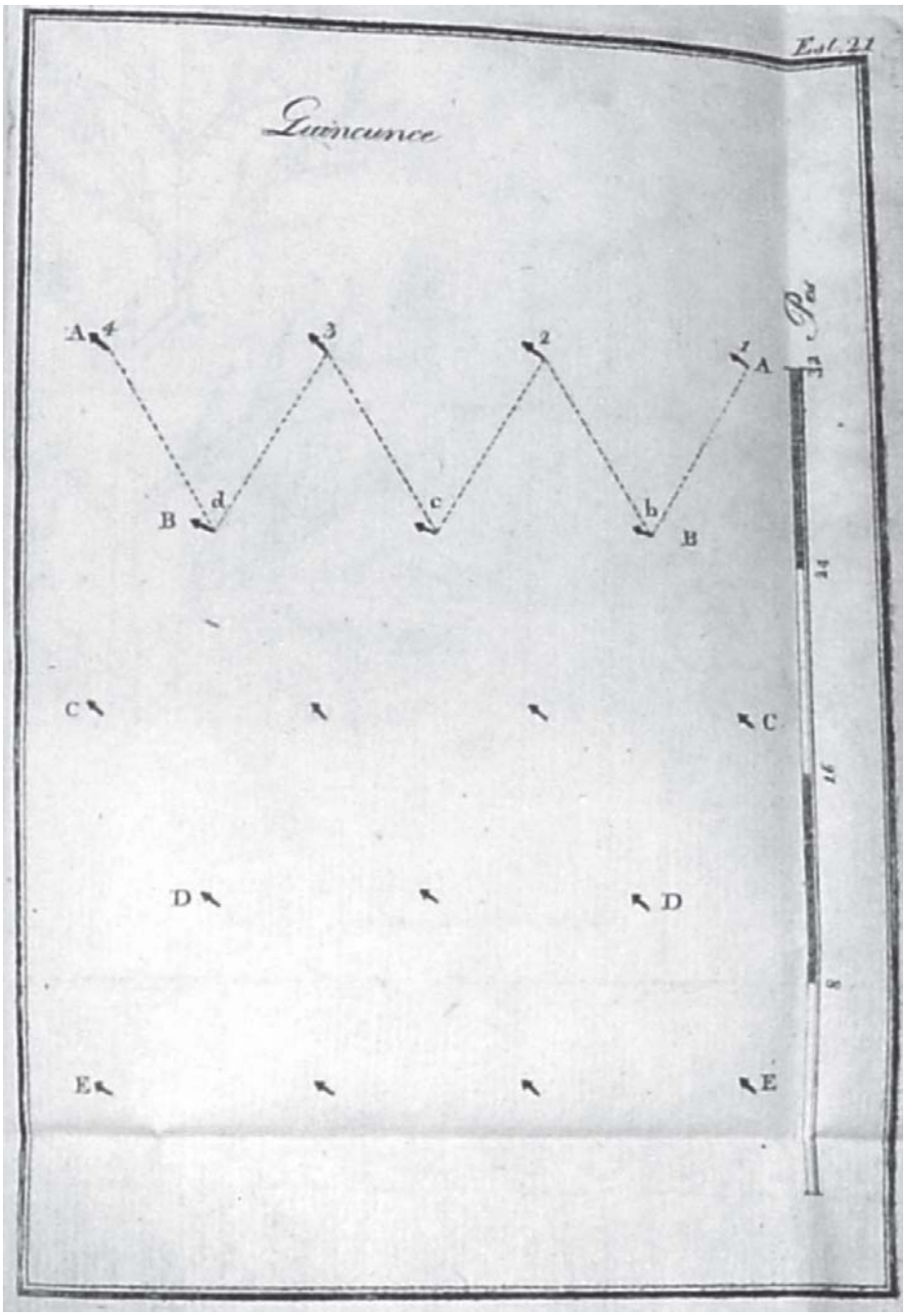

Figure 1: Planting in quincunx (Laborie, 1800)

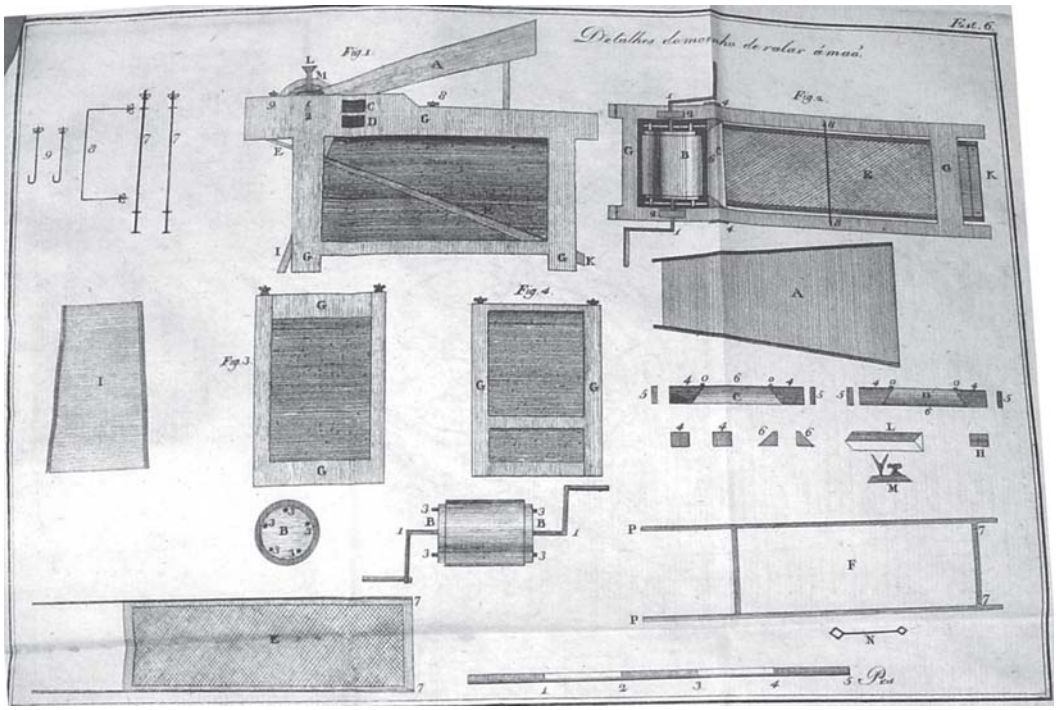

Figure 2: Manual de-pulping mill (Laborie, 1800)

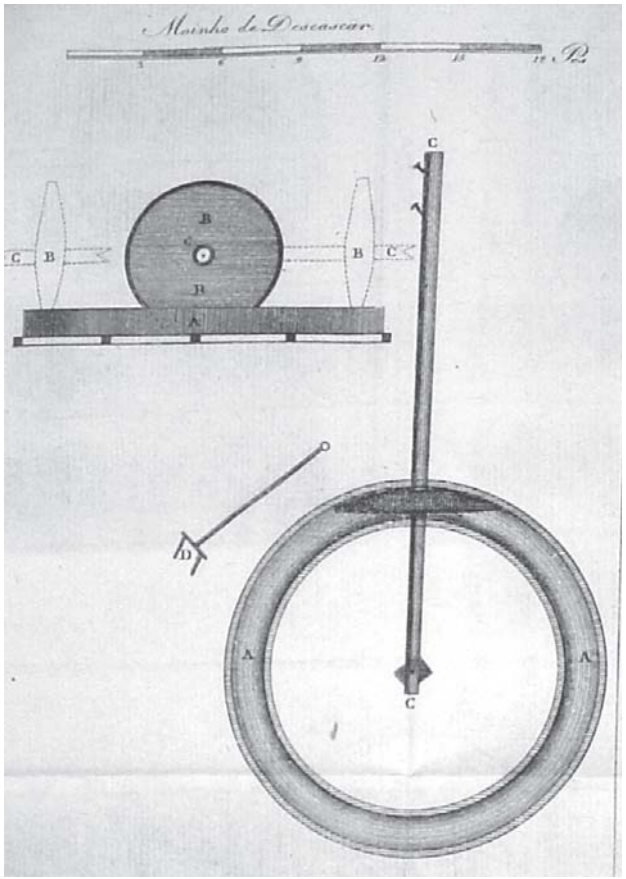

Figure 3: Hulling mill (Laborie, 1800)

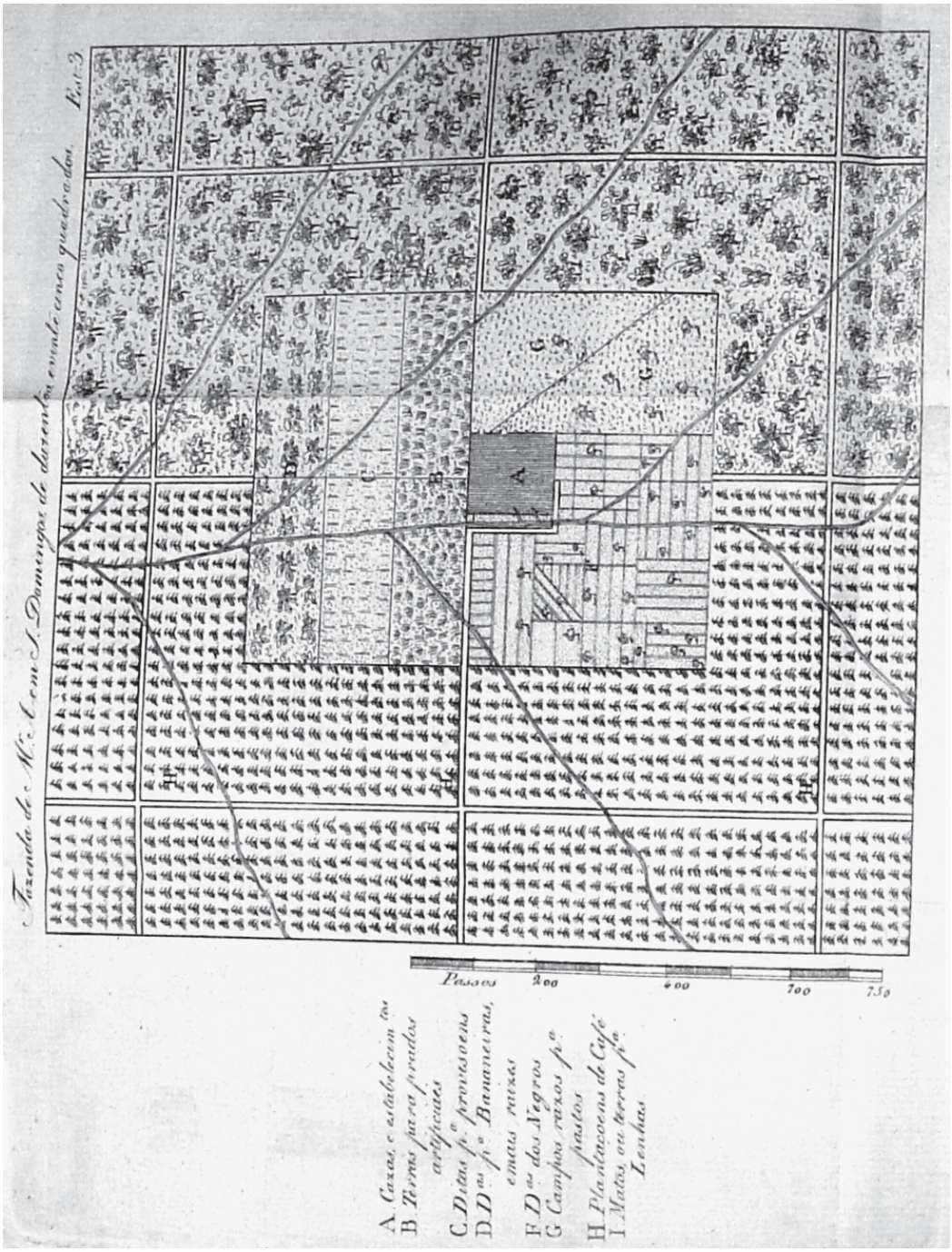

Figure 4: Plan of a coffee habitation (Laborie, 1800)

As can be noted by the scale, the property would have about 1,500 square paces (English pace = 0.762m), in other words, about 27 geometric *alqueires*. Laborie did not indicate the number of slaves, but, one observes in the detailed plan of the habitation center sixty housing units, constructed according to the slave housing model that he prescribed (Laborie, 1800, p.136; Figure 5, L); as three captives would be allocated to each unit, it is calculated that around 180 slaves could reside at this property. The coffee tree space expressed in these plans showed the concern with the plantation's landscaping treatment, strictly related to the disciplining of its material and social space. The manor house, containing the coffee barn(A), would occupy the center of the whole complex, giving the proprietor visual control of the productive process (drying yards K coupled to the mill E), the nurseries (B), the hospital (D), and the slave quarters (L). In the words of Laborie (1800, p.104-105; free translation from this edition), "the houses … must be so situated that the master can see and hear everything and give orders."

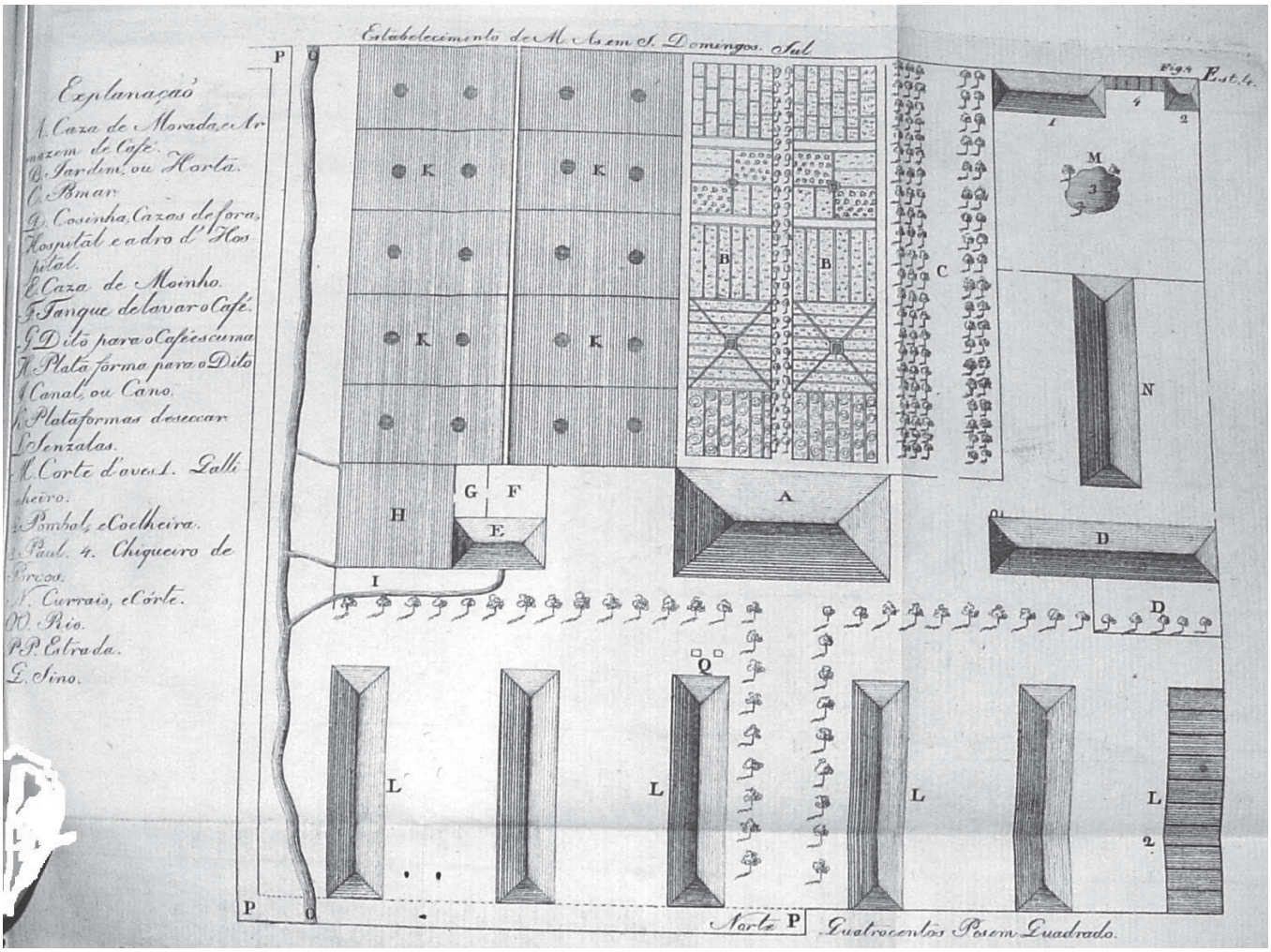

Figure 5: Detail of the center (Laborie, 1800)

Translating Laborie: the Cuban *cafetales* and the coffee plantations of Tijuca

The quality of Laborie's treatise, coupled with the weight that the Santo Domingo coffee production had in the world market up to the start of the slave revolution quickly caught the attention of scholarly men in the Iberian universe. The Portuguese translation, published in 1800, followed almost immediately after the original version, while in Cuba, a translation was published in Spanish in the first decade of the nineteenth century. There was, however an appreciable contrast between these two published works.

The Cuban translation was prepared in the molds of the Economic Society of Friends of the Country and the Royal Consulate of Havana, erudite institutions founded in the 1790s by slave masters and colonial authorities based on the model of their metropolitan peers, with the basic objective of promoting the revitalization of the island's slave economy (Álvarez Cuartero, 2000, p.16). Pablo Boloix was the most prominent person who promoted the culture in these two institutions. In 1797, for example, he conducted, at their request, an inventory of the coffee plantation units in the island's western region, seeking to identify those that could serve as a model for those who intended to invest in the sector (Van Norman Jr., 2005, p.65-69). As part of those efforts and his involvement with the coffee culture, Boloix personally became involved in the translation of Laborie's manual, whose first edition in Spanish appeared in 1810 (Laborie, 1820, p.112). Therefore, the active participation of Cuban slave masters in the task is prominent, an institutional situation similar to that of the *Cercle des Philadelphes* of Santo Domingo.

The Portuguese edition was the earliest, but, on the other hand, it did not involve an institutional network that relied upon the active participation of Portuguese American slave masters. As a matter of fact, the immense publishing activity undertaken by Frei Veloso in Portugal, with financial and political support guaranteed by Dom Rodrigo de Sousa Coutinho (Curto et al., 1999), was not bound to the immediate demands of those who invested in slave exploitation. Veloso surrounded himself with many former Coimbra students from Brazil for the publishing tasks that he directed, but none of them behaved as a direct representative of the American slaveholder interests. We can take the case of the translation of Laborie's manual, which was entrusted to Antonio Carlos Ribeiro de Andrada, the brother of José Bonifácio. Concerning this, there is the very significant testimony – cited by historian Maria de Lourdes Vianna Lyra – of José Feliciano Fernandes Pinheiro, one of the Brazilian students who gravitated around Veloso:

> Finding myself one day with Antonio Carlos, a fellow countrymen and friend who was also unemployed, he told me that Manuel Jacinto Nogueira da Gama had invited him to collaborate in a literary and printing establishment that had been founded… named *Arco do Cego* [the Arch of the Blind]. Management of the establishment, created under the auspices and protection of the Overseas Minister D. Rodrigo de Sousa Coutinho, was entrusted to teaching priest fr. J.M. Conceição Veloso ... who was a pensioner of the State, entrusted with finding associates who would help in that literary enterprise. The benefits offered were lodgings in the building, which included board, and especially government recognition of our abilities. Our task was to translate all the works that were given to us (Lyra, 1994, p.84).

As we will see later on, in two decades Nogueira da Gama would become prominent as a large coffee grower in the Paraiba Valley, but in 1800 he was only an unemployed young

man in Lisbon, with no direct connections to the universe of slave production in Portuguese America. The same can be said about Antonio Carlos, son of a rich commercial family from Santos, and of all of the others that participated in the undertaking led by Veloso. The supposition underlying the publishing action ordered by Dom Rodrigo de Sousa Coutinho was that the slave producers of Portuguese America, ignorant and backwards in agronomy matters, needed a strong, sure and enlightened hand to guide them in modernizing their enterprises, a hand that could only be supplied by the learned in service of the State. Veloso set this conception forth in the preface to the first volume of O Fazendeiro do Brasil, dedicated to the Prince Regent Dom João. In his words,

> I herein account for this work, to which I was entrusted in his August Name, to wit: to bring together and translate into Portuguese all of the foreign memoirs that might be of use to establishments in Brazil, for the improvement of its rural economy and the factories that depend on it, so that, having been so helped, they can escape from the backwardness and debility in which they presently find themselves, and put themselves on a par with those of our wealthy neighboring Nations of the same Continent, in both the quantity and quality of their goods and output (Veloso, 1798, preface).

The institutional differences present in the act of translating Laborie's manual are suggestive to understanding its destiny in Cuba and in Brazil. Despite the generous remuneration for the editor and translators and the graphic refinement adopted, Laborie's translation into Portuguese was incomplete: the fourth chapter of the original edition, which presented to its readers the general lines of the Antillean theory of slave management (Marquese, 2004, p.129-167), disappeared in O Fazendeiro do Brasil. In other words, the translation of Veloso and Antonio Carlos had little to offer regarding what eventually might be of most interest to whoever was in charge of large groups of slave workers. The almost complete disinterest in the collection shown by of the seigniorial classes in Portuguese America, therefore, is not surprising. Its dissemination was a complete fiasco, beginning with the fact that, as well recalled by Manuela Domingos (1999, p.102), "the financial soundness [of the publishing business] did not concern Frei Mariano." Given the few copies that were sold, the colonial authorities decided to distribute free of charge the collection volumes to Brazilian colonists. Even so, the strategy did not work: several indications can be found of the indifference of the rural landowners to the copies that they were given (Dias, 2005, p.111-112).

We have little information regarding the circulation of the Spanish translation of Laborie's manual in Cuba, but the setting up of the *cafetales* on the island in the 1790s and 1800s enables us to affirm that the agronomy of Santo Domingo supplied the standard for the slave masters resident there. The product began to be cultivated on a large scale in Cuba after the Santo Domingo slave revolution, relying upon the presence of fleeing French colonialists. Given its geographical proximity and favorable environmental conditions, the island's mountainous region of the east received most of the French refugees. The new immigrants were important for the transmission of the technical know-how needed for production of the good, and this knowledge was rapidly spread among the landowners who were setting up coffee plantations on the western part of the island. Up to 1807, Cuban production did not exceed one thousand tons, but the large-scale planting

effected beginning in 1804 enabled this number to jump to 4,600 tons by 1810. In the following decade, production fluctuated considerably, reaching about 10,000 tons in 1815 and 1821 (Perez de la Riva, 1944, p.50; Marrero, 1984, v.11, p.108; García Alvarez, 2006).

The Cuban production continued growing in the following decade. Despite international prices having fallen sharply between 1822 and 1830, it practically tripled in the period, reaching in 1833 a figure close to that of Santo Domingo in 1790, that is, some 29,500 tons. This was the result of expansion of the area under cultivation and the consequent number of slaves allocated to the activity. In 1827, sugar and coffee production employed in Cuba the same number of slave laborers, around 50,000 (Marrero, 1984, v.11, p.114).

The role of the French in the formation of the Cuban coffee culture was recently put into relative perspective by Van Norman Jr. (2005), who argued that the activity was already underway when the Santo Domingo refugees arrived. Nevertheless, the fact remains that the productive plan of the Cuban coffee plantations obeyed the general lines established in the French colony, as in fact that historian himself points out. The analysis of two typical *cafetales* of the western zone for which we have a visual record, proves this nicely. The first is the La Ermita, located in Serra do Rosário, west of Havana. In 1838, the property, with 44 alqueres (Ramírez Pérez, Paredes Pupo, 2004, p.92), was lithographed by the French artist Federico Mialhe, who had recently arrived in Cuba at the expense of the Economic Society of Friends of the Country to document visually the colony (Figure 6). The so-called French plan can be observed in several elements: in the stone yards, divided by containment walls; the circular borders, with the respective conical huts; the central location of the manor house, with its nursery to the left, and the wheel driven de-husking mill, located in the last building to the right of the picture. For environmental reasons, the unit adopted the dry processing method, like most of the *cafetales* in the western zone (Ramírez Pérez, Paredes Pupo, 2004, p.60-63). The only difference in assemblage compared with the one Laborie prescribed based on the Santo Domingo experience was the shading of the coffee plantations, an innovation of Cuban production (Van Norman Jr., 2005, p.72-74) that can be noted in Mialhe's lithograph – in this case, deploying palm trees on the hill to the left of the picture.

The second example comes from the province of Matanzas, certainly the most dynamic region of Cuban slavery-related agriculture in the first half of the nineteenth century, with heavy support from foreign investors (Bergad, 1990; Barcia Paz, 2000). The relatively flat topography of the region enabled many of its landowners to precisely follow Laborie's precepts regarding the symmetry and uniformity of the productive plan. The La Panchita *cafetal*, located in the district of Guamacaro (Matanzas) and having 83 *alqueires* at the time the fine map of Figure 7 was made, demonstrates the adoption of a "trazado del cafetal a la francesa, a modo de proyecto urbano, con jardines geométricos, avenidas principales, rotondas" (plan of the French style coffee plantation in the urban project manner, with geometric gardens, main avenues, rotundas; Carlos Venegas Fornias, personal communication, Sep. 2007). Two aspects, however, distinguish this property from the 'French' model. The first is the fact that it was a mixed plantation, which combined the large-scale production of coffee and sugar (although the first area was larger, as can be seen in the plan), something which, as far as is known, did not exist in Santo Domingo.

The second aspect is the disposition of the *batey* (center): the slave quarters are located apart from the yards and the manor house (the most ample building, right below the yard, that, as Laborie prescribed, also functioned as the -coffee barn), laid out in two parallel lines and comprised of 26 shacks, or *bohíos*, as they were called on the island.

Despite the distinctions pointed out, it can be affirmed that, in the western zone of Cuba, those who invested in the coffee plantation business followed the productive plan that Laborie made renowned in his treatise: the layout of the fields, their symmetry, the centralized location of the dwelling and processing buildings and the careful construction of the drying yards.

The Brazilian response to the economic opportunities opened for coffee cultivation with the Santo Domingo Revolution was a little bit slower than the Cuban. The effect of the activity's growth only took place after the royal Portuguese family relocated to Brazil. Reflecting the situation before the opening of the ports to trade, the average coffee exports of Portuguese America from 1797 to 1811 were about 400 tons per annum. In the five-year period 1812-1816, the impact of the direct trade with the world market and its rapidly rising prices was felt: the Brazilian coffee production rose to an average annual 1,500 tons. In the following five year period (1817-1821), it grew four times in comparison with the previous five-year period, jumping to 6,100 annual tons. In the years of independence (1822-1823), production doubled, reaching 13,500 tons, which placed the Brazilian figure on a par with that then obtained in Cuba (Samper, Fernando, 2003).

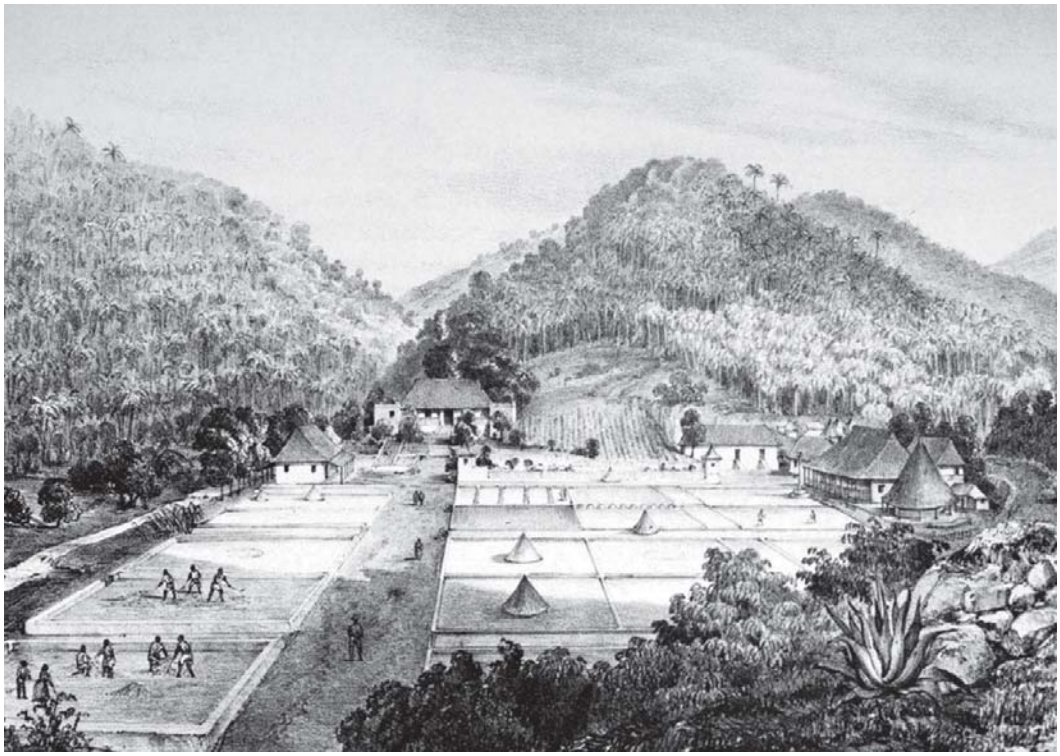

Figure 6: La Ermita *cafetal*, Lomas de Cusco (Mialhe, 1838)

Figure 7: Plan of the La Planchita *cafetal* and mill, 1830 (Biblioteca Nacional José Martí, Havana, Cuba)

During these years under review, there are consistent indications of the contribution of French Caribbean techniques in a specific region of Brazil: the Tijuca forest on the outskirts of the city of Rio de Janeiro. Louis François Lecesne is prominent among the foreigners of different origins who came to reside in the mountains of Tijuca some years after the establishment of the center of the Portuguese empire in its American portion. According to sources assembled by Gilberto Ferrez (1978), Lecesne was born in France. Educated in medicine, he moved to Santo Domingo, where in the 1780s he became a coffee producer. The slave revolution forced him into exile, first to Cuba and, then, with the persecution of the French refugees due to the capture of the royal Spanish family by Napoleon, to Brazil. He arrived in Rio in 1816 and soon acquired land in the heights of Tijuca, immediately setting up the São Luis plantation, with 14 *alqueires*.

The constant peregrination of foreign visitors to Tijuca gives us a good repertoire of information about the property. In 1817, it was visited by Spix and Martius, who noted the planting of 60 thousand bushes. According to the information that Lecense gave them,

> The new trees are planted in the four corners of a rectangle and one in the center. Many planters observe the distance of 6 feet; others, however, 4 feet, justifying this by the fact that some bushes always die. Letting the plant grow to a height of 12 feet, more or less, cutting the more luxuriant growth in the middle to facilitate the harvest of the berries and allow the branches to extend more horizontally. At the end of four or five years, harvests are already very considerable and enough for one black to take care of a group of one thousand trees. Before, when the coffee trees did not produce or produced little, one black was sufficient to care for two thousand and remove the harmful herbs from them. The three harvests take almost the whole year; the first begins in Rio de Janeiro in April. Only the red, very ripe berries are picked, which are easily freed from their stems and whose seeds are readily separated from the pulp. These berries are no longer, as was done formerly, accumulated in piles to decompose. Instead, if special care is desired, the whole berries are dried with the pulp and, afterwards, de-pulped in a sort of mill, and the cleaned seeds are exposed to the sun for over a month until they become completely dry. For this purpose, yards of some 25 to 30 square feet are constructed of bricks or pressed clay in a convex shape so rain can drain off. They try to protect the beans against sudden rain showers using portable straw mats. In each of the above-mentioned sized yards, some 30 *arrobas* [a measurement of weight equal to about 15 kilograms] of coffee can be spread out. The number of blacks, each one collecting one *arroba* daily, thus determines the number of yards needed (Spix, Martius, 1981, v.1, p.84-86; free translation from this edition).

Based on what can be read in the above report, the agronomy techniques employed by Lecesne (quincunx, separation, pruning, the proportion between slaves and coffee bushes, collecting only ripe berries and adjusting the yard dimensions and labor force employed in the harvests) were the same as prescribed by Laborie. The same is also true for the yard. The description of the two naturalists, on this point, should be complimented with the visual record that Maria Graham gives us in a pencil drawing made in 1825, when she visited the plantation (Graham, 1990; Figure 8). As can be seen in the forefront, the yards of the São Luis plantation were constructed according to Laborie's instructions (1800, p.120-121; free translation from this edition): "to separate the platforms and close them off from the outside, they are surrounded with small fences or stone walls measuring 6 inches high by 6 inches wide, with small openings on the outside to let rainwater out."

A second example of property in Tijuca that followed the Santo Domingo productive plan is the Nassau plantation, belonging to Dutchman Alexander von Moke. Ernest Ebel visited it in 1824 and noted the same planting pattern employed in Lecesne's neighboring plantation, in other words, 6 foot quincunxes. Regarding the machinery for processing, which was done by drying, Ebel wrote: " [the] mill ... consists of two wheels, a half foot wide and made of heavy wood, which turn on an axle and over a channel into which the beans are deposited. A fork follows the wheels to collect the pressed beans that escape by the sides, more or less like in oil mills. For this, V. Mook erected a fine stone construction that also served as a shed. The mill machinery is especially robust and driven by water from a river that falls abundantly, moving a device that drives the very hard wooden wheel" (cited in Ferrez, 1978, p.13-14; free translation from this edition). In other words, the same device prescribed by Laborie (Figure 3) and employed by the Cuban plantations.

All indications are that the Santo Domingo model was employed in Tijuca based on the direct experience of the foreigners who settled there. In other words, the translation of Laborie's manual ordered by Veloso taught these coffee cultivators little in the setting up of their units, contrary, therefore, to what happened in Cuba, where the Economic Society of Friends of the Country and the Royal Consulate of Havana, relying upon the active participation of the slave masters residing on the island, served as a forum for technical discussion and dissemination of knowledge relative to the activity. At the end of the 1820s, based on techniques as those propagated by Laborie's manual, the Cuban owners obtained a coffee production volume equivalent to that of Santo Domingo in 1789, with no terms of comparison for the limited production of Tijuca.

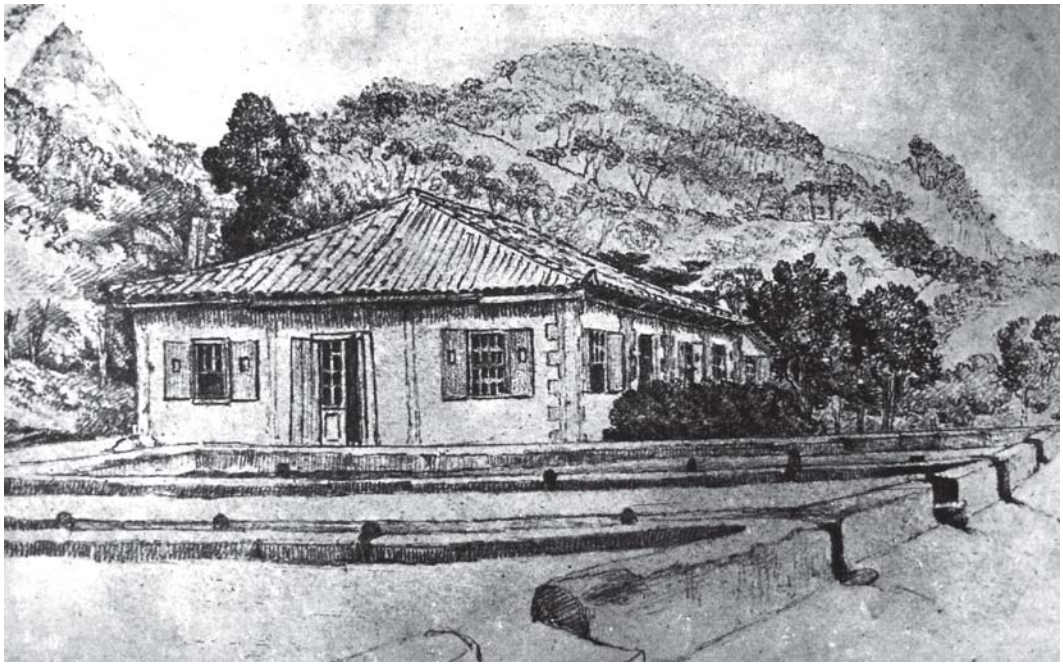

Figure 8: São Luiz Plantation (Graham, 1990)

Coffee culture in the Paraiba Valley: the new plantation of the 1830s

As soon as they reached the pre-revolutionary Santo Domingo level, the Cuban coffee cultivators began to feel the weight of Brazilian competition, still coming from the province of Rio de Janeiro, but now also from the mountain range above (Marquese, Tomich, in the preface). In fact, the growth in Brazilian production in the 1820s was overwhelming. Its volume quadrupled, jumping from 13,500 metric tons in 1821 to 67 thousand in 1833. This latter figure was equivalent to the entire world production of 1790 and more than double what Cuban coffee growers obtained that year (Samper, Fernando, 2003). The Santo Domingo production, until then unattainable, was definitely a thing of the past.

At the start of the 1830s, Brazil reigned as the largest world producer of coffee, well ahead of the other competitors (Cuba, Java, Jamaica, and Haiti). Almost all of the Brazilian production, moreover, came from a new region historically: the middle valley of the Paraíba do Sul River, known simply as the Paraiba Valley, which encompassed land of the provinces of Rio de Janeiro, São Paulo and Minas Gerais. Relatively unoccupied at the start of the nineteenth century, in less than two generations that region was profoundly transformed, being converted into a typical plantation zone. To do so, its landowners relied upon on one of the largest inflows of enslaved Africans to the New World up to then (Eltis et al., 1999).

The domination that the Paraiba Valley began to hold over the world coffee market did not only result from the massive mobilization of slave workers and unexploited natural resources. The plantations of the region presented important innovations to the slavery-related knowledge originally developed in Santo Domingo and that, as seen, had supplied the technical basis for the *cafetales* of Cuba and the coffee plantations of Tijuca. Such a modification can be observed in the agronomy publications that circulated in the Brazilian Empire in the 1830s.

O Auxiliador da Indústria Nacional (The National Industry Assistant), a periodical published by the Sociedade Auxiliadora da Indústria Nacional (The National Industry Assistance Society – Sain, in Portuguese) beginning in 1833, was, without a doubt, the main vehicle for discussing agronomy in Brazil up to the 1870s (Silva, 1979; Marquese, 1999, p.157-203). In its first three years of publication, the memoirs relative to coffee were limited to returning to the lineage inaugurated by Frei Veloso. Sain's debt to the generation of the enlightened Luso-Brazilians is undeniable and the publication of a memoir on coffee in the March 1835 *O Auxiliador*, written by octogenarian José Caetano Gomes, makes explicit some of the bonds that joined the post-independence generation with that of the authors from the turn of the 1770s to the 1780s (Dias, 2005). Caetano Gomes had a work on sugarcane published in 1800 by the Arco do Cego printing house, directed by Frei Veloso, and in 1835, due to his agronomy knowledge, he wrote a memoir on the coffee culture at the invitation of Sain. Gomes, however, looked to Cuba's past, instead of dealing with what was then happening in Brazil, and presented an accounting prepared by the Economic Society of Friends of the Country of Havana in 1797 – in the same production context as Pablo Boloix's inventory – which demonstrated the high yield of the sector.[4] Gomes' purpose was to demonstrate the possibilities for Brazilian plantation owners to obtain the same rates of return if they employed in Brazil the processing technique

that he erroneously believed was in effect in Cuba: the preparation of coffee by the wet method (Gomes, 1835).

The same procedure of looking to the Caribbean was presented in a memoir of José Silvestre Rebello, published in 1833. The author wrote it based on Laborie's manual, considering it the best ever written on the subject. However, after setting forth the steps of the wet method, Rebello recorded a Brazilian innovation in the membrane removal phase, superior to both circular mills and, especially, manual crushers:

> a countryman of ours invented a system of moving the crushers themselves, whereby one could regulate the impact of the blow, and, whether using water or animal power as the motor, the service is at least duplicated and, therefore, useful. The inventor of this machine obtained his patent, as previously informed by this Society; and today one is in service and generating good visible results on the Luiz José de Araújo Plantation in Volta Grande, next to the Paraíba in Piraí. Other plantation owners, seeing the good results, decided to establish similar ones; and the inventor, Joaquim Theodoro da Roza, now also finds himself employed in building them in those places (Rebello, 1833, p.17).

The quote indicates the technical path that was being taken in the Paraiba Valley. Additional research is needed on the topic, but it is very likely that it concerns the crusher mill (Figure 9), an adaptation of the mechanism originally prepared in Europe for mining (Agricola, 1950, book 8), which was also employed in Portuguese America to process rice (Kantor, 2004, p.259-260).

The plantation owners of the Valley, however, adopted the crusher mill with a dry processing method in mind that was very distinct from that used in the productive plan of Santo Domingo. This becomes evident in the first agronomy work founded on the practices of the Paraiba Valley, which appeared in 1836 with the title *Pequena memória sobre a plantação, cultura e colheita do café* (Small memoir on the plantation, cultivation and harvest of coffee). Its author, Father João Joaquim de Ferreira de Aguiar, 31 years old at the time, had resided for five years on the Desengano Feliz plantation in the municipality of Valença – which Affonso Taunay (1939, v.5, p.14-15) supposed belonged to Manuel Jacinto Nogueira da Gama, the Marquis of Baependi, the same person who had worked as translator for Frei Veloso – and he carefully observed the techniques developed there. His objective, by introducing it to the public at his reading at the Sociedade Promotora da Civilização e Indústria da Vila de Vassouras (the Vila de Vassouras Civilization and Industry Promotion Society; a sort of local variant of Sain), was rightly that of indicating the departure that they represented from the Caribbean techniques, thus contrasting them with what the *O Auxiliador da Indústria Nacional* had up to then propagated (Aguiar, 1836, p.5-6).

I highlight three aspects of this new technical pattern. The first relates to the agricultural sphere. In addition to abandoning planting in quincunx, the coffee growers of the Paraiba Valley employed wide spacing between the lines of trees laid out vertically from the top to the bottom of the rounded hills that were typical of the region. Based on the quality of the land, the bushes were placed some 14 to 16 *palmas* (three to three and a half meters) apart from each other. While in the method prescribed by Laborie there were about 15,700 bushes per *alqueire*, the practice adopted in the Valley involved a density of only 3,900 to 5,100 bushes per *alqueire* (Marquese, 2008a, p.143).

The wide spreading of the bushes and the vertical planting alignment were connected with the second innovation in the Paraiba Valley, which concerned labor management. Apart from the good supply of land in the region, the apparent waste of land involved in such massive planting obeyed the priority of visually controlling the slaves. In the harvests or pruning, each slave was allocated to a row of trees, beginning his work from the top of the hill until reaching the bottom: the overseer or foreman at the base would have full control, observing – in the case of the pruning – if the row of captives followed the same path dictated by the lead workers, or – in the case of the harvest – if they failed to harvest from a particular tree (Aguiar, 1836, p.12). The plantation owners of the Paraiba Valley also innovated in the task system: contrary to Laborie's precept, they determined that the

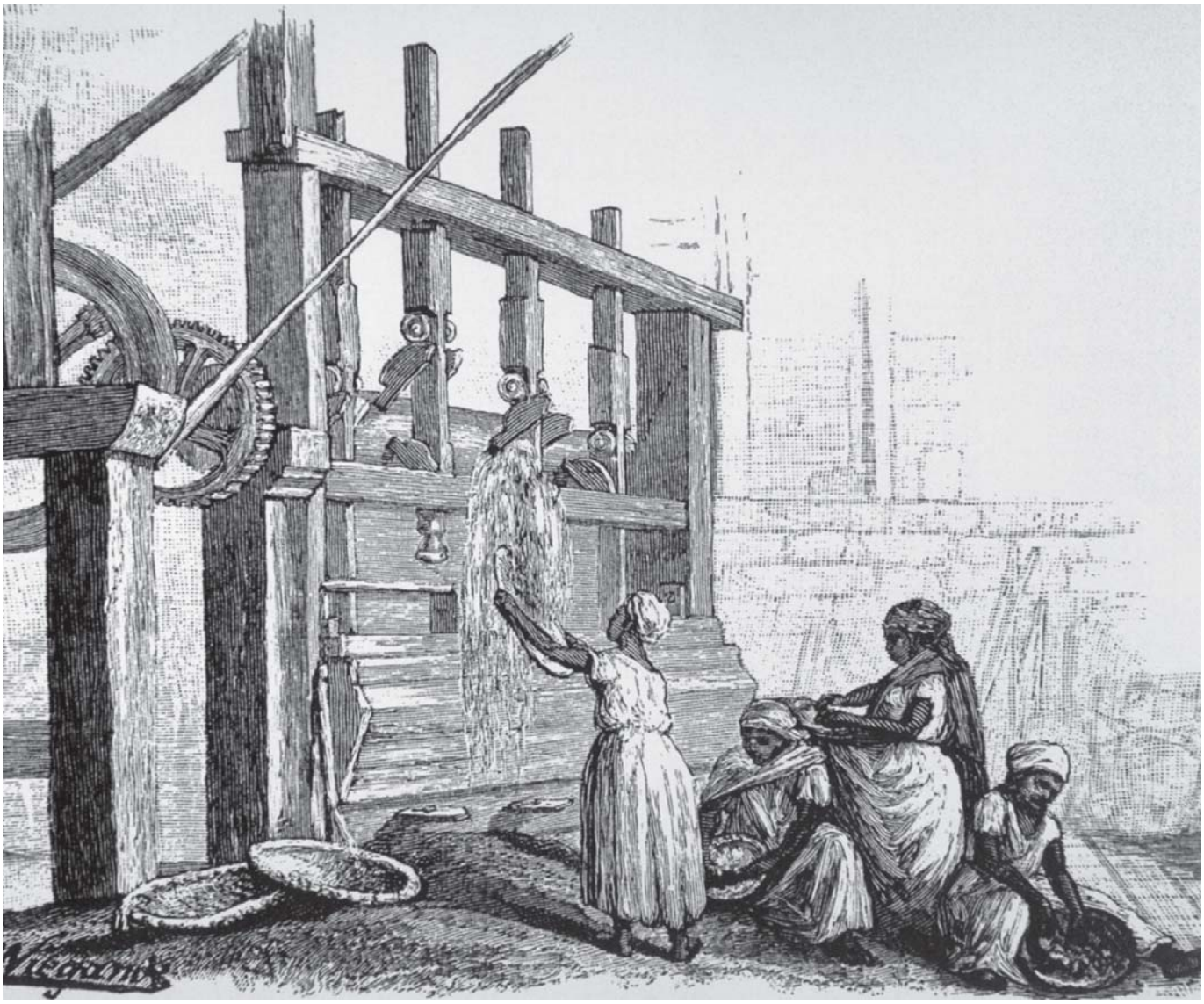

Figure 9: Crushing mill (Smith, 1878)

slaves would indiscriminately harvest green and ripe berries, compensating them with money, rather than free time after completing the job. What was more important for the owners was the quantity rather than the quality of the berries collected, with the maximum economy of labor (Aguiar, 1836, p.12-13; Marquese, 2008a, p.144).

Finally, the focus on product quantity explains the third innovation. The dry method did not represent something new per se, but it did in the way it coordinated processing the volume harvested. According to Aguiar's report (1836), the drying of the berries was done on yards of compacted earth until the pulps were completely dry; in most establishments, the separation of the pulp and the membrane was done in the crushers. The mechanism had been rapidly disseminated over the past four years because, according to Aguiar, "the work is expedited much more quickly" (p.16) – we have here a good indication of the dissemination of the machine invented by Joaquim Theodoro da Roza in 1832. Aguiar recognized the backwardness of this processing procedure relative to that employed in the Antilles and highlighted the need to introduce into Brazilian plantations de-pulping machines that could "sharply reduce the time and work spent in drying the coffee together with all of its pulp on the ground" (p.17). From the viewpoint of the plantation owners of the Paraiba Valley, machinery that saved labor allowed the shifting of more slaves to the clearing work, increasing the number of coffee bushes cultivated and, in consequence, the amount produced. For Aguiar, given this precise objective, Sain must disseminate Antillean methods of processing coffee, using concrete examples, rather than the mere translation of memoirs on the subject (Aguiar, 1836, p.14).

Aguiar's call for de-pulping machines capable of saving time and labor had a response. In 1843, for example, Antonio da Silveira Caldeira published in a pamphlet a de-pulping mechanism that, according to him, was capable of processing 300 *alqueires* of coffee in the husk every ten hours (Caldeira, 1843). The invention was disseminated the year before by plantation owner Joaquim Eduardo Leite Brandão in his thesis presented to the College of Medicine of Rio de Janeiro (Brandão, 1842), and the year after the pamphlet was published, it was incorporated into the manual written by Agostinho Rodrigues Cunha (1844). Up to the 1860s, however, the de-pulpers available in the Brazilian market were not adopted by coffee growers, because they were technically incompatible with the volume of beans collected. Francisco Peixoto de Lacerda Werneck (1985), in his famous memoir originally published in 1847, assessed that Caldeira's method, notwithstanding its merits, had "little duration," in other words, it became useless after a short time of use (p.69).

For these reasons, between the 1830s and 1860s, the method of prolonged drying on compacted earth yards (after 1850, increasingly paved) and processing the pulp by crushing mills predominated in the plantations of the Paraiba Valley. The innovation in this combination was found in the substantial increase in production, the result of an equation that involved the area planted, the product volume, the labor force exploited, the yard dimensions and the bean processing. Aguiar (1836, p.6) recalled that, in the municipalities of Vassouras and Valença, there were "establishments having 500, 600, 800 thousand coffee bushes and sometimes even more." The coffee plantations of the Paraiba Valley stood out from their peers in the New World precisely because of the employment of many more slaves and much more land and coffee bushes per productive unit. We can observe this in

the Boa Vista plantation in Bananal, a typical example of the large properties that dominated the region's landscape beginning in the 1830s. In the following decade, when it was in full operation, the beans of 700 thousand coffee bushes, planted in 137 of its 349 *alqueires* and operated by a slave contingent comprised of more than 400 workers, were all dried in immense yards of compacted earth and processed by a complex mill of hydraulic crushers (Marquese, 2008b; Figure 10).

The historiography has often treated the coffee culture of the Paraiba Valley from the viewpoint of backwardness, highlighting aspects such as the dependence on slave labor and an agronomy that stripped environmental resources, rudimentary processing techniques and low-quality coffee. This view, which arose in the nineteenth century, was recently updated by works such as those of Warren Dean (1996, p.196-204) and José Augusto Pádua (2002, p. 244-260) who, by giving priority to the environmental theme, indicated the long-term irrationality that was practiced in the Paraiba Valley. For some considerable time, however, social scientists have pointed out the intrinsic rationality of the economic dynamics of the region's coffee culture (Fragoso, 1983; Slenes, 1986). Maria Sylvia de Carvalho Franco (1983), in a classic work published in the 1960s, noted that

> The 30s [of the nineteenth century] found fully formed the conditions that would determine the model and sense of the characteristic practices of coffee businesses [in the Valley]: large-scale production, low prices and high profitability guaranteed by markets in expansion. In the capitalist centers, concomitantly with the constitution of the salaried worker class, mass consumption tendencies firmed up, and, well suited to this type of market structure, Brazilian coffee was produced abundantly and cheaply (p.172).

I have sought to highlight in this article, according to this second historiographic tradition, the innovation of the technical pattern of the Paraiba Valley. The contrast between the model propagated by Laborie and adopted in Cuba and the one that Aguiar presented in the 1830s indicates the development of new slavery-related knowledge, directly related to expansion of the Brazilian coffee culture and the change in the nature of the world market for the product, which went from the restrictions characteristic of luxury consumption to a scale, qualitatively different, of mass consumption (Topik, 2003; Marquese, Tomich, in press). In a new cycle of capital expansion, the new seigniorial class that was

Figure 10: Detail in oil on canvas of the Boa Vista plantation, c.1880 (Lemos, 1999, p.146)

formed in the central-south part of the Brazilian Empire managed a new productive plan (Arrigui, 1996; Mattos, 1987). The innovation of the coffee culture of the Paraiba Valley – the secret of its radical modernity – was found precisely in the massification of the productive process, with a consequent increase in the exploitation of natural and human resources. It should be noted, finally, that it was the domination over the world market created by this new productive pattern that enabled Brazil to become, beginning in the 1870s, a great center producing scientific knowledge on the coffee culture (Ribeiro, 2006; Ferrão, 2004, p.38-47), while Cuba became converted into a zone of sugar-related innovation (Fernández Prieto, 2005).

NOTES

[1] All quotations from works and documents in Portuguese have been freely translated into English.

[2] Laborie's daughter, for example, in 1790 married Jean Barré de Saint-Venant, an active member of the *Cercle des Philadelphes*. For this and other biographical information on Pierre-Joseph Laborie mentioned here, see http://www.ghcaraibe.org/bul/ghc011/p0078.html (accessed on July 23, 2008).

[3] It is worth highlighting that the Jamaican coffee culture appropriated the precepts of Laborie; see, in this respect, the works of Higman, 2001 and Monteith, 2002.

[4] A reproduction of the accounting can be read in Marrero, 1984, v.11, p.100-101.

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