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ABSTRACT

In the late nineteenth century, the rise of fungi diseases on coffee plantations throughout British Ceylon resulted in the collapse of Ceylon's coffee economy. The spread of the *Hemileia vastatrix* fungus was made possible by profit-oriented cultivation techniques that included the felling of biodiverse forests and the implementation of monocultures. Previous research on Ceylon's plantations looked at Britain's policies through a socioeconomic lens, focusing on the intersection between colonial racism and capitalism. Rightfully so, historians condemned the harsh labour conditions for local labourers on coffee plantations. Foucault's concept of biopolitics has regularly been applied to address racist hierarchies. From an environmentalist standpoint, this paper intends to provide an alternative to anthropocentric human-centred histories. It does so by bringing Foucault's biopolitics into a conversation about more-than-human actors on plantations such as fungi and coffee plants. The colonial agriculture manuals written by British colonial administrators and scientists are leading in the analysis of how plantations were shaped according to their human-centred, capitalist, and racist rationale. With precision, they describe the desired location of plantations, how labour should be organised, how plants should be cultivated, and how the *H. vastatrix* should be exterminated. Additionally, the data from these manuals is incorporated by the author into a set of thematic maps that illustrate the downfall of Ceylon's coffee production from a geographical perspective. This research adds to the historiography on colonial agriculture and Ceylon's coffee production in particular by showing the reciprocal relationship between human actions and those of more-than-human actors.

BY

Lars Marée

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Introduction

> The blossoming is the most beautiful sight that greet the planter's gaze. … His fields are covered with full-blown flowers, white as flakes of driven snow, loading the air with the most fragrant perfume.[1]

One finds this nearly poetic quote in *The Coffee Planter's Manual* (1880) by the British botanist Alex Brown, who was active in British Ceylon as a coffee planter.[2] Brown takes the aspiring coffee planter by the hand, introducing him to the art of coffee cultivation. British Ceylon had become the world's major coffee producer by the mid-1800s and is, therefore, at the centre of his manual. Ironically, contrary to Brown's romantic description, Ceylon's plantations had been plagued by a fungus disease for over a decade already. The *Hemileia vastatrix* fungus induced coffee rust disease, caused farmers to face lower yields, and led to the eventual deterioration of affected plants. The fungus wreaked havoc wherever it came, and the island's plantations were almost all abandoned before the turn of the century.[3]

Brown's manual is one of the many nineteenth-century documents written by British colonial administrators and scientists. They describe elaborately how forests were exchanged for extensive coffee plantations, how labour was dealt with, and detailed the supposedly correct approach to plant diseases. In this primary source material, one finds numerous examples of the British colonial philosophy that put non-Western and more-than-human actors in inferior positions.[4] The "comparatively weak physique" of the native in contrast to the "naturally more robust European," as described by entrepreneur Edmund Hull, is illustrative of a colonial racism.[5] Moreover, to hunter and coffee producer Samuel Baker, the island's dense forests were mostly an "obstacle" that would have caused "inexpressible disappointment" to the hunting "sportsman."[6]

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1 Alex Brown, *The Coffee Planter's Manual* (Colombo: Ceylon Observer Press, 1880), 41.

2 Brown, *The Coffee Planter's Manual*, 41.

3 Stuart McCook, "Global Rust Belt: *Hemileia vastatrix* and the Ecological Integration of World Coffee Production Since 1850," *Journal of Global History* 1, no. 2 (2006): 177–178.

4 References to this colonial philosophy can be found in the following works, see Samuel W. Baker, *The Rifle and the Hound in Ceylon* (Philadelphia: J.B. Lippincott & Co., 1875); Edmund C. P. Hull, *Coffee Planting in Southern India and Ceylon* (London: E. & F.N. Spon, 1877); Brown, *The Coffee Planter's Manual;* Edwin Lester Arnold, *Coffee: Its Cultivation and Profit* (London: W.B. Whittingham & Co., 1886).

5 Hull, *Coffee Planting in Southern India and Ceylon*, 49. This edition bundles the first edition of his work in 1865 and additional notes added in 1877.

6 Baker, *The Rifle and the Hound in Ceylon*, 25.

Contemporary environmental scholars have widely criticized this colonial thinking. The historian James Duncan discusses how racist ideas in colonial philosophy reflect environmental determinism. That is, the "reduced mental capacities" of people in Ceylon would have been a product of the inherently unhealthy tropical climate. Seeing colonialism as a civilizing mission, the British aimed to replace "backward" local traditions of mixed subsistence gardening with Western "rational" monocultures. Duncan stresses the saturation of enlightened ideas of "rationality" in the British approach to agriculture.[7] Similarly, the scholar Ravi Rajan argues colonial monocultures to have been a system of "quantification and economic rationalization."[8]

Following increasing interest in environmental change, most scholarly publications on Ceylon's coffee production stem from the twenty-first century. Essentially, the knowledge production on colonial agriculture has its centre in anglophone academia. Western voices strongly dominate the archives historians have at their disposal. This counts for both contemporary literature and the nineteenth-century primary sources. The latter were written solely by men who were higher up in the colonial administration such as owners of plantations or scientists. The silence in the archives thus has a racialised and gendered character. Despite this silence, the colonial sources are useful in explaining the British belief of their superiority over Ceylon's people and environment.

In literature about human labour on plantation sites, French philosopher Michel Foucault's theory of biopolitics is reoccurring. Foucault discusses how power structures settle in the everyday lives of people and subject their bodies to what he calls "biopower."[9] In his words, "biopolitics deals with the population as a social problem that is at once scientific and political."[10] Duncan applies biopower to explain the worsening health of native labourers under the colonial regime.[11] In addition, Christine Quinan broadens the definition of biopower beyond humans to a "systematic monitoring and regulation of living organisms."[12] Quinan mentions that "biopolitics" and

7 James S. Duncan, *In the Shadows of the Tropics: Climate, Race and Biopower in Nineteenth Century Ceylon* (Aldershot, 2006), 1–2, 7–8.

8 Ravi Rajan, "Imperial Environmentalism or Environmental Imperialism? European Forestry, Colonial Foresters and the Agendas of Forest Management in British India, 1800-1900," in *Nature and the Orient: The Environmental History of South and Southeast Asia*, ed. Richard H. Grove, Vinita Damodaran, and Satpal Sangwan (Oxford University Press, 1998), 327.

9 Michel Foucault, *Society Must Be Defended: Lectures at the Collège de France, 1975-1976,* trans. David Macey (Picador, 2003), 245.

10 Foucault, *Society Must Be Defended*, 245.

11 Duncan, *In the Shadows of the Tropics,* 20–23.

12 Christine Quinan, "Necropolitics," in *Posthuman Glossary,* ed. Rosi Braidotti and Maria Hlavajova (Bloomsbury Publishing, 2018): 270–272.

"necropolitics" are two sides of the same coin.[13] That is, power structures do not only indicate which bodies are legitimate to live (biopolitics), but also which are not (necropolitics). This paper will show that in Ceylon, colonial biopower ordered that the coffee plants were meant to live while the fungi were meant to die.[14]

Undoubtedly, the *H. vastatrix* is to blame for the downfall of Ceylon's plantations. This history is, however, more complex. Foucault's thinking about biopolitics and necropolitics reveals a complicated philosophy behind the practices of a plantation economy; a philosophy with little consideration for more-than-human agency. Therefore, this paper questions what caused the sharp decline of Ceylon's coffee production in the late nineteenth century. It argues that an analysis of human and more-than-human biopolitics is essential to understanding this historical change. Scrutinizing the more-than-human agency under the structures of biopower is of added value to the historiography. It proves that humans do not act in isolation, but rather interdependent networks that include other life forms.

The first chapter, "A Plantation Logic," zooms in on the transformation of biodiverse forests into monotonous plantations. It aims to understand the reasoning through which Ceylon's plantations were given shape. Herein, the central concept is a "plantation logic," borrowed from Maan Barua's *Plantation Worlds.*[15] This human geographer scrutinizes British plantation policies in Assam, India. A plantation logic is a set of principles that lies at the root of plantations as sites of dehumanization and natural resource exhaustion.[16] In a similar manner, taking the colonial manuals as reference works, a plantation logic of coffee cultivation in Ceylon is explored. The chapter is ordered chronologically: from forest to field to complete plantation.

The second chapter, "The Fungal Moment," deals with how the *H. vastatrix* came to life. The epidemic, despite its span over the 1870s and 1880s, is taken as a historical moment that was conclusive for Ceylon's coffee economy. Mycologist Nicholas Money provides essential knowledge on the behaviour of fungi as active actors.[17] In response to the fungus, British farmers added shade, moved their production to higher elevations, and applied biochemicals. The insights from mycology helps to understand why these

13 Quinan, "Necropolitics," 270–272.

14 Quinan, "Necropolitics", 270–272.

15 Maan Barua, *Plantation Worlds*, (Duke University Press, 2024), 28.

16 Barua, *Plantation Worlds*, 28.

17 Nicholas Money, *The Triumph of the Fungi: A Rotten History* (Oxford University Press, 2007), 52–56.

strategies had little to no success.[18]

Inevitably, the environmental historian struggles with the human-centredness of language. It is necessary to make phrasings more sensitive to actors that are not human. Two examples are mentioned here. First, this paper uses "more-than-human" to describe the forests, plants, and fungi in this history. It stresses the possible experiences beyond the human scope and avoids the dichotomy between "human" and "natural" as the term "non-human" implies. Second, talking about biopower inevitably involves discussing the "bodies" subjected to it. In this paper, "body" is taken to indicate both human bodies and more-than-human bodies alike.[19]

A Plantation Logic

I. Defining a Plantation Logic

The colonial plantation was a complex system with a variety of actors upon which the colonial regime put its mark. In his study of Assam's plantations, Maan Barua introduces a plantation logic to designate the conventions behind the violent spaces that colonial plantations had become.[20] To Barua, there is no such thing as "one" plantation logic since it is experienced differently by different actors in different geographies. This paper consistently follows the indication of the concept with an indefinite article. Barua defines a plantation logic as follows:

> A "plantation logic" is a system or set of principles underlying the arrangement of elements that foster and operate via the violent "planting" of people considered subordinate in colonial and racial hierarchies as cheap labor to bolster crop economies, the transformation of land purportedly seen as belonging to no one to the services of a racial and colonial economy, and a deep dispossession and dehumanization of people.[21]

At the core of this definition is a system that treated the native labourers on plantations violently. To Barua, colonialism and racism are two intertwined concepts. Simultaneously, Barua gives space to an understanding of more-than-human actors affected by a plantation logic. Since Ceylon's fertile hill landscape had belonged to no one in the colonisers' eyes, it could easily be annexed and commodified. With social, cultural, and economic codes of

18 Arnold, *Coffee: Its Cultivation and Profit*; Money, *The Triumph of the Fungi*, 50–77.

19 Barua, *Plantation Worlds*, 16.

20 Barua, *Plantation Worlds*, 28.

21 Barua, *Plantation Worlds*, 28.

conduct as part of its definition, a plantation logic reflects a system that is profoundly historical.[22]

The capitalist appropriation of natural resources is addressed by Jason W. Moore's Marxist critique. In *Capitalism in the Web of Life,* Moore states that "capitalism depends on strategies for appropriating the unpaid work/energy of human and the rest of nature."[23] Making a profit over Ceylon's natural resources is a form of adopting unpaid labour. The transformation of forests into coffee plantations is what Moore calls the use of "Cheap Nature." While the land was intensively used for little cost, the British benefitted from the competitive advantage of their product on the European market. Cheap, however, did not mean cheap in the long run since many coffee farmers paid the high price of bankruptcy for their monocultures.[24] Barua historicizes Moore's theory stating that "the production of cheap natures cannot be cleaved from the ravages of race and colonialism."[25]

II. The Colonial Manual as a Genre

The nineteenth-century source material is infused with references to a plantation logic. Four sources are worth mentioning here. *The Rifle and the Hound* (1875) is a travel account of Samuel Baker's hunting expedition in Ceylon.[26] Although not touching upon coffee much, it includes critical opinions on the people and the environment. Then, three relevant manuals are *Coffee Planting in Southern India and Ceylon* (1877) by Edmund Hull, *The Coffee Planter's Manual* (1880) by Alex Brown, and *Coffee: Its Cultivation and Profit* (1886) by Edwin Arnold.[27] Despite their remarkable enthusiasm for the coffee enterprise, these works all stem from a period in which coffee rust had been frustrating farmers throughout the island for years on end.

A closer look should be taken at the agriculture manual as its own genre within colonial literature. Rather than telling a story, manuals were meant to teach novel planters how to cultivate their crops and to update farmers on technological advances in the agricultural field. Indeed, Hull encourages

22 Barua, *Plantation Worlds*, 28.

23 Jason W. Moore, *Capitalism in the Web of Life: Ecology and the Accumulation of Capital* (Verso, 2015), 53–54.

24 Moore, *Capitalism in the Web of Life*, 53–54. In his introduction, Moore elaborates on four forms of Cheap Nature: (1) low-cost food, (2) labour power, (3) energy and (4) raw materials.

25 Barua, *Plantation Worlds*, 25.

26 Baker, *The Rifle and the Hound in Ceylon*; Hull, *Coffee Planting in Southern India and Ceylon*; Brown, *The Coffee Planter's Manual*; Arnold, *Coffee: Its Cultivation and Profit.*

27 Hull, *Coffee Planting in Southern India and Ceylon*; Brown, *The Coffee Planter's Manual*; Arnold, *Coffee: Its Cultivation and Profit*.

"young planters to derive an equal proportion of practical benefit."[28] Similarly, Brown's preface states "it is to be hoped that the whole will be found most useful and suggestive to the young planter as well as to all interested in the chief industry of Ceylon."[29] The manuals distinguish themselves from other colonial sources in their step-by-step approach to coffee cultivation. Their subsections deal with a variety of topics such as "how to fell a tree," "how to build a bungalow," or "how to do the bookkeeping."[30]

Instead of seeing the manuals as independent or objective, they should be historicized for their role as tools of colonialism. The references to knowledge production in British academic societies such as the Royal Agricultural Society and the Chemical Society were frequent. In his case study on timber production, Barua describes plantations as "places where imperial sciences of calculation, control, and profit … were practiced and furthered."[31] This corroborates the argument that colonial authors felt an epistemological superiority over Ceylon's natives. Local knowledge systems were to be replaced by knowledge from European institutions. Hull dismisses native knowledge by suggesting that the natives merely cultivated coffee "with the view of obtaining its fragrant white blossom for the decoration of temple shrines."[32] Similarly, the statement that "the natives exhaust the soil" with their cultivation techniques shows Baker's distrust of their agricultural knowledge.[33] Imposing these manuals as blueprints on Ceylon's soil and people thus silenced native knowledge.

III. Four Categories of a Plantation Logic

The manuals list a range of steps that planters were expected to follow if they wished to start a successful plantation. The subsections dealt with by the authors are too numerous to fit this chapter. Therefore, the most relevant elements to illustrate a plantation logic are analysed in four chronological categories: the location of the plantation, the clearing of the forest, the organisation of a (more-than-human) labour force, and the estate's administration. In this overview, the sharp observer might miss the treatment of pests like the *H. vastatrix.* Although this topic is elaborately discussed in the manuals, it finds a place in the second chapter regarding the fungus epidemic.

28 Hull, *Coffee Planting in Southern India and Ceylon*, viii.

29 Brown, *The Coffee Planter's Manual*, no page number.

30 Hull, *Coffee Planting in Southern India and Ceylon*; Brown, *The Coffee Planter's Manual.*

31 Barua, *Plantation Worlds*, 26.

32 Hull, *Coffee Planting in Southern India and Ceylon*, 19.

33 Baker, *The Rifle and the Hound in Ceylon*, 130.

The authors agree that choosing the right elevation is crucial for the success of a plantation. Low elevations are too hot and too humid for coffee plants to thrive. In higher altitudes, the plants find a climate that is too cold. In 1865, Hull writes that at an elevation ranging from 2,500 to 3,500 feet, his "favourite and most fruitful" plantations are situated.[34] Between 500 and 5,000 feet, coffee estates under cultivation can be found. However, Hull adds that the trees above 4,000 feet have a "gloriously healthy appearance but hardly bear any crop."[35] On the low-lying plantations, then, coffee is only found growing under the shade of larger trees to withstand the heat of the midday sun. Benefitting from the cooler morning sun, an orientation to the east or northeast is recommended in the manuals. Moreover, the plantations on the eastern slopes are spared from the heavy rains and strong winds of the southwest monsoon.[36]

The climatic conditions demanded in the manuals not only limited the possible locations of the coffee plantations, but also subjected Ceylon's landscape to a form of commodification. That is, the hills were not only perceived as a geography in which to make a profit but, even more, as a place in which profit could be maximised. Hull's descriptions of the "most favourable conditions" tell more about the quest for capital accumulation than about the plant's habitat.[37] After all, although coffee plants easily grow outside of the 2,500–3,500 foot range, these areas lack the label of "favourable" or "suitable" because they are not "favourable" or "suitable" for maximum yield and maximum profit.[38] Besides that, the authors do not mention the human nor the more-than-human inhabitants of Ceylon's hills, let alone how plantations could affect them.

The three maps below have been carefully put together using the geographic information system QGIS. Maps help to visualize the topography of a plantation logic. They turn abstract measurements and toponyms from the source material into a comprehensive image. Map 1.1 displays the elevation map of Ceylon on which the mountain range in the centre-south of the island is clearly visible. Map 1.2 visualizes Hull's altitude criteria showing the regions suitable for cultivation in light green and the areas containing his "favourite and most fruitful plantations" in dark green.[39] The absence of plantations in coastal regions confirms the difficulty of growing coffee in lowland regions.

34 Hull, *Coffee Planting in Southern India and Ceylon*, 43.

35 Hull, *Coffee Planting in Southern India and Ceylon*, 40.

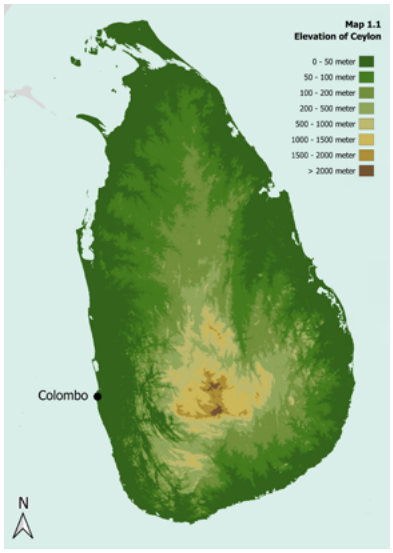
36 Hull, Coffee *Planting in Southern India and Ceylon*, 39–43.

37 Hull, Coffee *Planting in Southern India and Ceylon*, 39.

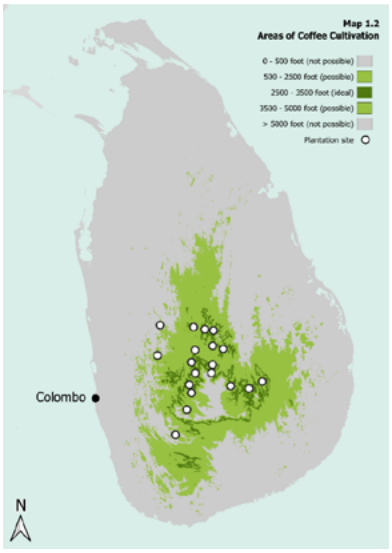
38 Hull, *Coffee Planting in Southern India and Ceylon*, 39; Brown, *The Coffee Planter's Manual*, 9–10.

39 Hull, *Coffee Planting in Southern India and Ceylon*, 43.

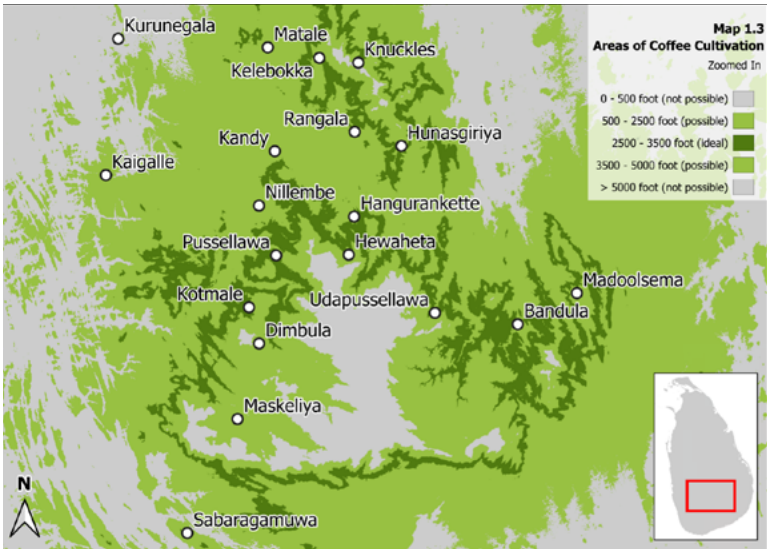
Lastly, Map 1.3 zooms in on Ceylon's coffee region. The vast majority of the coffee plantations indeed lie within Hull's range. The toponyms do not refer to individual plantations but to a settlement or village around which multiple plantation sites were established.[40]



Map 1.1
Elevation of Ceylon



Map 1.2
Areas of Coffee Cultivation



Map 1.3 Areas of Coffee Cultivation – Zoomed In

As to a logic of clearing the forest, Brown fosters a structural division of the slopes into subsections. He instructs that incisions should be made in

40 Toponyms have been gathered from Hull (1877), Brown (1880) and Arnold (1886) (see notes 5, 1, and 18). Mapping software: QGIS Development Team, *QGIS Geographic Information System*, v. 3.34.13, Open Source Geospatial Foundation, released 2024, https://qgis.org. Geospatial data: OpenTopography, Copernicus Global 30m Elevation Data (Copernicus DEM), accessed February 20, 2025, https://opentopography.org.

the trees growing lower on the slope: deep enough to destabilize the tree but superficial enough to not make it fall. The work is finished when the highest trees are chopped down, taking the already weakened trees with them in their fall. Brown describes this as "a thrilling moment" that has something "majestically grand."[41] Once chopped into pieces and left to dry for a month, the logs and branches are ready to be set on fire.[42] Arnold prescribes a similar procedure but is more elaborate on the ideal size of a clearing and the instruments needed for marking and measuring the forest.[43] Neither of the authors raise concerns about the consequences for the more-than-human life forms in the forest.

Two relevant remarks are made by contemporary scholars. First, the structured approach to the cutting of timber resembles what scholar of forestry Ravi Rajan has called the "quantification and economic rationalization" of forestry.[44] He draws a line from seventeenth-century German forestry practices to the policies of the British in their colonies. Rajan argues that the rationalization of forestry as a scientific field paved the way for monocultures.[45] An example of quantification and rationalisation in the manuals are the exact measures prescribed to structure the rows of coffee plants and the drainage canals. The mathematical precision behind the plantation's setup was meant to benefit the efficiency and profitability of the cultivation process. Structuring plantations through numbers and diagrams was also of aesthetic importance. Brown wrote, "it looks neater and prettier to have the rows all leading in one direction."[46]

Environmental scholar Paulo Tavares historicizes the European approach to forestry. In European humanist and Enlightenment thinking, "forests were seen as landscapes opposed to the human."[47] Not only did forests become subjects of scientific reason or rationalisation, but also of economic utilitarianism. In the European mind, the forest was "a natural resource to be rationally domesticated."[48] Linking the colony's jungle with concepts like "dark," "unsocial," and "pre-civilised," the colonial perspective on forests was coupled with moral discourses of social evolution and the racial inferiority

41 Brown, *The Coffee Planter's Manual*, 6.

42 Brown, *The Coffee Planter's Manual*, 5–7.

43 Arnold, *Coffee: Its Cultivation and Profit*, 69-76.

44 Rajan, "Imperial Environmentalism or Environmental Imperialism?," 327.

45 Rajan, "Imperial Environmentalism or Environmental Imperialism?," 324–328.

46 Brown, *The Coffee Planter's Manual*, 13.

47 Paulo Travares, "Forests," in *Posthuman Glossary*, ed. Rosi Braidotti and Maria Hlavajova (Bloomsbury Publishing, 2018), 163.

48 Travares, "Forests," 163.

of those inhabiting the space.[49] Duncan links the Enlightenment thinking to colonial biopower in Ceylon. He argues that "governmentality and biopower depended upon a hegemony of vision and knowledge necessary for political domination and the mastery over nature."[50]

This racist approach to Ceylon is easily deducted from the primary sources. The racist disdain is blatant. Baker calls the Vedda, a people in Ceylon's mountain region, "extremely ugly" and their children "squalid and miserable."[51] To the colonisers, racial characteristics mark the divide between the Tamil and the Sinhalese people. Whereas the Sinhalese inhabited Ceylon before the European colonisation, many Tamils came to Ceylon as imported labour from British India.[52] Despite constituting a highly needed work force, the Tamils were regarded as less valuable because of their perceived "slenderness" and "lack of expertise." However, Brown adds, "the Sinhalese have an aversion to steady labour."[53] Therefore, the Tamil were expected to be the better pickers of coffee berries. To Baker, the Sinhalese would have "no character to work upon."[54] To avoid a change of climate, "hill-men" who were used to mountainous situations were the most desirable workers.[55]

This conceptualisation of the natives as weak, childish, or feminine led to a plantation logic in which authoritarian rule was deemed necessary to structure the work. Berries had to be picked, drainages had to be dug, and storage buildings had to be built. The layout of the plantation enabled the continuous supervision of the labourers. Brown recommends, "the lines of coffee should be made to run all one way … it being the most workable and the labourers being always visible to the superintendent."[56] Arnold tells new planters "to get as much work out of them as he reasonably can without being unduly harsh."[57] A plantation logic commodified the native people as cheap labour who received little in return for their lengthy workdays.

Duncan refers to plantations as "sites where new methods were sought to manage, discipline and regulate populations of migrant labourers."[58] It is in these spaces that racial biopower is exerted on the lives and bodies of natives.

49 Travares, "Forests," 162–164.
50 Duncan, *In the Shadows of the Tropics*, 1–2.
51 Baker, *The Rifle and the Hound in Ceylon*, 104.
52 Duncan, *In the Shadows of the Tropics*, 17.
53 Brown, *The Coffee Planter's Manual*, 4.
54 Baker, *The Rifle and the Hound in Ceylon*, 73.
55 Hull, *Coffee Planting in Southern India and Ceylon*, 71.
56 Brown, *The Coffee Planter's Manual*, 13.
57 Arnold, *Coffee: Its Cultivation and Profit*, 40.
58 Duncan, *In the Shadows of the Tropics*, 7.

European reason-based science supported the environmental deterministic claims that a tropical climate would inevitably bring forth degenerated people. Duncan writes that "the perceived frailties of the South Asian body justified a despotic and paternal colonial rule."[59] Biopower arose in the late eighteenth century as a rational intervention to discipline the individual and social body. In Ceylon, this discipline meant incorporating the native's body into a violent plantation economy that could only survive on the accumulation of profit. Arnold approaches this discipline as follows: "Get as much work out of them as he reasonably can without being unduly harsh, for in that case they would bolt, his estate would get a bad name, and he would be left entirely without labour."[60]

While European scientific theories of social evolution justified the governing of Ceylon's people, the science of botany justified the structured cultivation of coffee plants in monocultures. Barua phrases the work done by plants as "vegetal work."[61] The plants invest energy in the production of coffee, an energy that is commodified and exhausted in a plantation logic. The growth of the plant in itself should, however, not be called "work." Rather, says Barua, it is the "valorisation of its activity for a particular economic sector" that puts the plant to labour.[62] The coffee plant is cultivated in a specific historical condition, that is, the human-centred colonial plantation.[63]

The unnatural growth regime to which the coffee plants were subjected brings in the narrative of biopolitics. First of all, the trees were planted in an environment different to their usual habitat. Moreover, they were cultivated in straight lines, frequently manured, and kept on a height ideal for workers to pick the berries. The latter is called "topping." It is described by Hull as keeping "the height of the plant within limits at which it can be conveniently dealt with by the coolies."[64] This performance of biopower is what Barua calls "anthropo-ontogenetic" pruning: growing a vegetable body "such that it maps onto a labouring worker's body."[65] Barua stresses that the biopower in a plantation logic—in the case of both human and more-than-human actors—is asserted in the historically specific context of racial colonialism. This is a criticism of Foucault's universalist approach to biopower.[66]

59 Duncan, *In the Shadows of the Tropics*, 23.
60 Arnold, *Coffee: Its Cultivation and Profit*, 40–41.
61 Barua, *Plantation Worlds*, 37.
62 Barua, *Plantation Worlds*, 37.
63 Barua, *Plantation Worlds*, 37–38.
64 Hull, *Coffee Planting in Southern India and Ceylon*, 222.
65 Barua, *Plantation Worlds*, 38.
66 Barua, *Plantation Worlds*, 56.

The last relevant principle behind a plantation logic is the elaborate administrative work to run a plantation. The manuals tell their readers all about the calculating of costs, revenues, and rainfall. The development of the global coffee price is closely watched as well as the yearly rainfall and the ideal height to which the trees should be pruned. Hull shows what costs and revenues new planters can expect up to seven years after establishing a new plantation. The mathematics behind this administration relates to what Rajan calls "sustained yield."[67] The frequent calculations, originally adopted to secure a consistent profit from the timber in Germany's forests, are used in Ceylon to secure a consistent yield on the plantations. Interestingly, a decade after Hull, Arnold only dares to give estimates over a three-year period. This seems to be a sign of the growing insecurity over the plantations' future. In any case, seeing the coffee economy's downfall, the expected revenues must have turned out highly inaccurate.[68]

A plantation logic, even when only briefly explored in this chapter, has proven to be historically complex. Uncovering the scientific basis of racist and anthropocentric colonial policies reveals the necessity of historicizing a plantation logic. In a plantation logic, Ceylon's natural resources were appropriated through a prejudiced utilitarian vision of a "Cheap Nature" that supposedly belonged to no one. Simultaneously, racial and colonial biopower made the commodification of human and vegetal work possible. The manuals describe the steps through which human and more-than-human bodies were used in a system driven by maximum profit.

The Fungal Moment

I. A Fungal Way of Being

A narrative that gives space to fungi requires a dive—or at least a dip of the toes—in the life cycle of fungi. Mycology, a subdiscipline of microbiology, deals with their behaviour. Nicholas Money is a mycologist who published *Triumph of the Fungi: A Rotten History.*[69] His work is a synthesis of a science-based story of fungi reproduction and a humanities approach to the historical reactions to fungi diseases. The *H. vastatrix* in Ceylon is one of Money's case studies and includes a discussion of coffee rust alongside a primary source analysis of British entrepreneurs and botanists.[70]

67 Rajan, "Imperial Environmentalism or Environmental Imperialism?," 333.

68 Arnold, *Coffee: Its Cultivation and Profit*, 216–221; Rajan, "Imperial Environmentalism or Environmental Imperialism?," 333–334.

69 Money, *Triumph of the Fungi*.

70 Money, *Triumph of the Fungi*, 45–64.

According to Money, the *H. vastatrix*, in its confrontation with the coffee plant, centres upon the stomatic pores on the underside of the coffee leaf. While the plant uses these pores to breathe, the fungus finds its entrance into the plant. Once inside, the fungi form colonies that apply a feeding structure that is not meant to pierce the cell, but rather to connect to it and, subsequently, parasitize on the cell's nutrients. The fungus absorbs the plant's food until the tree has nothing left for itself to stay alive. It is a process of slow violence in which the host plant dies cell by cell. In the meantime, on the outside of the plant, the fungus germinates through spores. Moist conditions like those of Ceylon's monsoon period are ideal for the spores' multiplication. With its spores being remarkably resistant to long periods of drought, the *H. vastatrix* is able to reactivate itself at the start of the next monsoon season. As is usual in the fungal reproduction cycle, each infected leaf can bring forth countless spores. The slightest breeze is thus sufficient to fill the air with billions of them. Even in the dead leaves on the forest or plantation floor, the fungus finds hosts on which to parasitise.[71]

Employing mycology to give fungi a voice is both useful and problematic. The development of mycological science in the nineteenth century is connected to colonial interests. Mycology served the colonisers' attempts to ban fungi diseases from plantations and maintain the economy's profitability. Thus, the same knowledge employed to explain fungi in this paper was once used to exterminate them. However, as stressed by Money, it is often forgotten that fungi are "essential agents of decomposition and dispersers of nutrients throughout the ecosystem."[72] Importantly, the fungus itself is not a disease. Its labelling as a pathogen cannot be seen in isolation from profit-driven colonial agriculture. Capitalism is thus prevalent in a plantation logic.

II. The British Response

From the microscopic perspective, this paper zooms out and turns to the moment when the fungus was first noticed by coffee planters. Rather than the human-centred phrasing discovery of the fungus, the identification or noticing of the fungus implies that the organism had already been there but had simply remained unnoticed by the coloniser. In 1869, coffee rust was first identified in Madoolsema in the east of the coffee region through "orange blotches on the underside of the leaf."[73] George Thwaites, director of the Botanical Gardens near Kandy, collected samples of the mushroom. These were sent overseas to be studied in English research institutes. There, mycologists examined

71 Money, *Triumph of the Fungi*, 52–55.

72 Nicholas Money, *Mushroom* (Oxford University Press, 2011), 59–60.

73 Money, *Triumph of the Fungi*, 49.

the case and coined the fungus' name. The translation of *Hemileia vastatrix* reads "smooth destroyer," and, indeed, destroying plantations was what the *H. vastatrix* did. The immediate concern of British scientists with solving the fungal problem on their coffee plantations proves the close ties between scientific and capitalist interests.[74]

It must not have been easy to distinguish the effects of this fungus from the harm done by other pests. Most of these pests were insect populations like the leaf borer, the black bug and the white bug.[75] In the notes to the 1877 edition of his work, Edmund Hull complains that "yet another scourge has been added to the planter's already formidable list of troubles."[76] A year after being infected, the coffee plants lost their leaves and bore no more coffee berries. Soon after, they would die out en masse. Hull concludes that despite the containment efforts, already in 1875, "whole districts had been devastated."[77] Nevertheless, he kept his hope that the disease would be on the decline. A decade later, Arnold knew better. He concludes that the disease seemed to appear every other year.[78] The numbers published by *The Ceylon Observer Press,* illustrated in Figure 2.1, confirm his observation.[79] In the 1870s, the coffee production fluctuated and steadily declined in the 1880s.

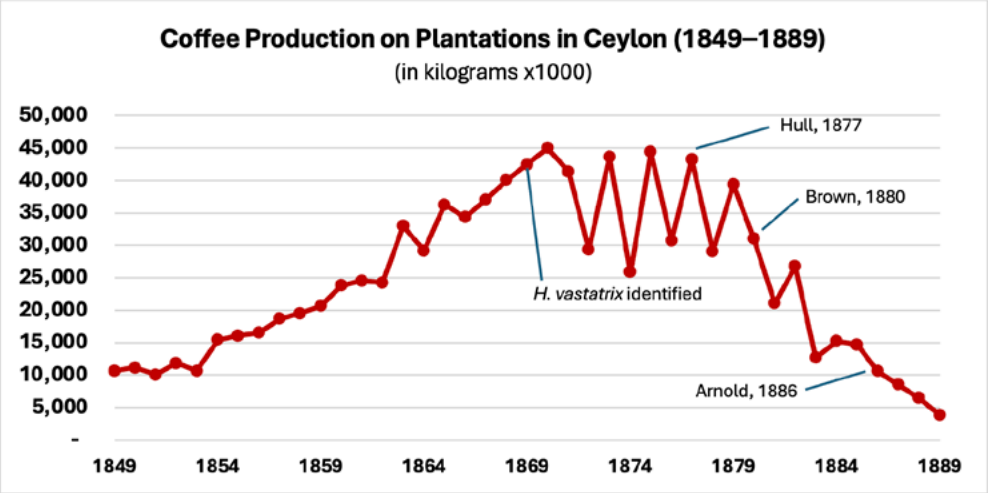


Figure 2.1 Coffee Production on Plantations in Ceylon (1849–1889)

74 Money, *Triumph of the Fungi*, 49.

75 Hull, *Coffee Planting in Southern India and Ceylon*, 264–273.

76 Hull, *Coffee Planting in Southern India and Ceylon*, 271.

77 Hull, *Coffee Planting in Southern India and Ceylon*, 271.

78 Arnold, *Coffee: Its Cultivation and Profit*, 129.

79 "Our Coffee Export Trade," in *The Ceylon Handbook and Directory* (Colombo: The Ceylon Observer Press, 1890/91), no page number.

While scientists researched the fungus in laboratories in Ceylon and in the United Kingdom, farmers on the ground had to develop strategies to overcome the epidemic. It is important to note that from an anthropocentric plantation logic, beating the fungus never had the goal of restoring a balance in Ceylon's ecosystem. The British strategies were capitalist and Eurocentric in their focus on keeping the coffee economy running.

The most accessible intervention was adding shade to the plantation. The first chapter shows how the British radically felled all the trees without exception. As environmental historian Stuart McCook describes, the dispense of trees providing shade, initially, brought more land into cultivation and increased profits.[80] The coffee plant, however, originally grew on the forest floor in Ethiopia where protection from sunlight by surrounding trees was abundant. Unfortunately for the farmers, the lack of biodiversity had already made their monocultures vulnerable. On top of that, the direct sunlight weakened the coffee plants and enhanced the fungus's effectiveness. The biopower of a plantation logic thus weakened the health of human and vegetal labourers alike. In response, Brown prescribes to "leave a tree every 40 feet" to provide a shade cover for the coffee plants.[81] As much as creating shadeless monocultures was an exertion of biopower to increase profits, monocultures that included shade were a result of measures to keep a capitalist system in place. One way or another, coffee was to be cultivated.

Adding shade did not prove sufficient. A second and more drastic measure was the abandonment of low-lying plantations, thereby moving coffee cultivation to drier and higher altitudes. The disease seemed less virulent in drier climates. The escape to disease-free areas was, however, not a long-lasting strategy. The *H. vastatrix* spores were carried quicker by the wind than farmers could act. Moreover, since its spores could survive periods of drought, the fungus proved to be adaptable to Ceylon's higher regions. It is this adaptability that shows how fungi could be subjected to colonial biopower but still have the agency to act. In fact, they shaped a successful survival strategy. Duncan's notion of a "non-human movement resisting against colonial power" reflects the fungus' capability to act.[82]

As mentioned in the previous chapter, Hull describes the ideal elevation range for coffee to have been 2,500 to 3,500 feet.[83] With the spreading coffee

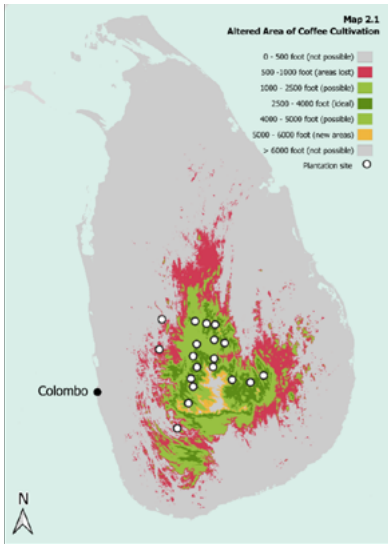
80 McCook, "Global Rust Belt," 181–182.

81 Brown, *The Coffee Planter's Manual*, 15.

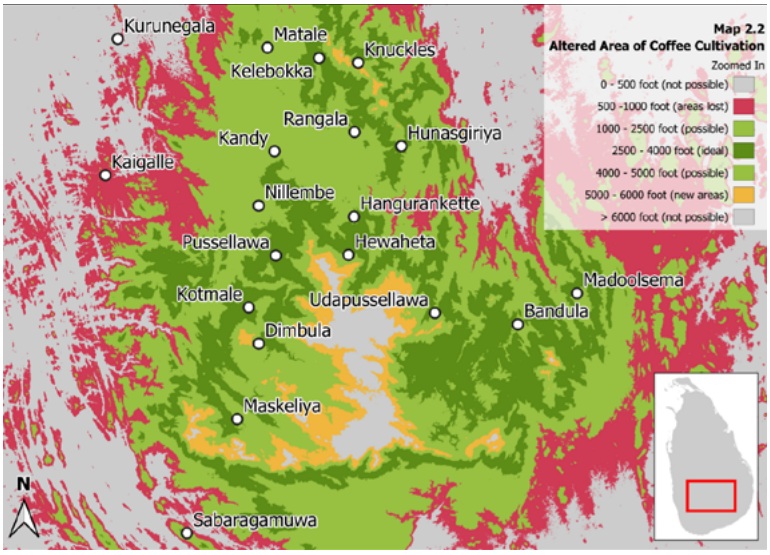
82 William Gervase Clarence-Smith and Steven Topik, *The Global Coffee Economy in Africa, Asia, and Latin America* (Cambridge University Press, 2003), 103; McCook, "Global Rust Belt," 181–182.

83 Hull, *Coffee Planting in Southern India and Ceylon*, 39–42.

rust, the boundaries of what was deemed ideal started shifting. The hot and humid climate of the lowlands favoured the multiplication of the fungi. As a consequence, the plantations up to an elevation of 1,000 feet were the first ones to be lost. On top of that, as Brown writes, plantations started to be established in higher and drier regions even up to 6,000 feet.[84] Map 2.1 brings together the visualisation of how the cultivation area was altered and specifically illustrates the size of the area that was lost to coffee rust. Zooming in, Map 2.2 shows how sites like Kurunegala and Kaigalle have now completely fallen out of cultivation.[85]



Map 2.1 Altered Area of Coffee Cultivation



Map 2.2 Altered Area of Coffee Cultivation – Zoomed In

84 Brown, *The Coffee Planter's Manual*, xiii.

85 See note 40 above.

Third, as a result of the limited success of adding shade and relocating plantations, farmers started to experiment with biochemical pesticides. The notion of experimentation is relevant because the long-term effects of sulphuric acids were understudied and unknown at the time. Most planters used variations of the European-invented Bordeaux mixture of copper, sulphur and lime. This chemical spray reduced the levels of *H. vastatrix* but their efficiency—at least in Ceylon—was ambiguous and ultimately not enough. According to Money, fungicides were the most successful in preventing infections but came for many planters too late. The fungus adapted and "eluded the sprays by submerging itself in the flesh of the leaf."[86] McCook adds that farmers received little support from colonial institutions and were thus left to research the biochemicals themselves.[87] "Science offered understanding, but no solutions," Money writes.[88]

The incorporation of agrochemical products in a plantation logic shows how a logic altered its practices but remained profit-driven in its philosophy. Despite the damage of toxins to the biophysical environment, the employment of chemicals was celebrated as the coming of modernisation to Ceylon's agriculture. This has to do with the appraisal that chemistry received as a rational science. Hull lauds how "the advance of science brought manufactured fertilizers in our reach." A few lines later he praises chemistry for having made "immense strides to carefully compound fertilizers … specially manufactured to an enormous extent for every species of cultivation."[89] Interestingly, the chemical mixtures were not described as pesticides meant to "fight" organisms but as fertilizers which "help" the crops to grow.[90] Hull's words reflect the belief that chemistry can find a solution for every type of cultivation.

Contemporary mycologists have shown that monocultures gave the *H. vastatrix* a fertile ground to grow, germinate, and spread. In a plantation logic, the obstacles that would have prevented a fungus population to continue growing had been removed. It had become a plague that threatened colonial agriculture and was to be banished. Foucault's phrasing of biopower as a "problem of population" is more than relevant here.[91] Besides the governing of human behaviour, the fungi population had similarly become a problem to the colonisers. Knowledge constructed by imperial sciences became a biopolitical

86 Money, *Triumph of the Fungi*, 55.

87 McCook, "Global Rust Belt," 183–185.

88 Money, *Triumph of the Fungi*, 55.

89 Hull, *Coffee Planting in Southern India and Ceylon*, 310.

90 Hull, *Coffee Planting in Southern India and Ceylon*, 310.

91 Foucault, *Society Must Be Defended*, 245.

tool for planters to deal with fungi populations. In Duncan's words, the bodies of the fungi had inevitably become "vehicles of history." [92] Rarely did Ceylon's colonisers care about people nor did they have an eye for the well-being of the more-than-human.

The attempts to exterminate the fungus reveal necropolitical power structures. Quinan writes that necropolitics "uncover the mechanisms whereby certain bodies are 'cultivated' or for the purpose of enhancing life while others are marked for death."[93] Although the coffee planters had rather seen the fungus dead, the micro-organism showed adaptability to external threats. It was naive to think of fungi as passive agents that would simply be eliminated when confronted with chemicals. The reality of monocultures turned the expectations of coffee farmers around. The illusion of linear progress from premodern forests to profitable plantations shattered. Monocultural planting had exhausted the coffee plants. Here, Brown writes, "the coffee tree of 1880 is not the same robust healthy plant that it was in the days prior to the leaf disease."[94] Monocultures clearly took their toll.

Eventually, the *H. vastatrix* got its hold on Ceylon's coffee plants and left Ceylon's coffee industry in ruins. Coffee production became a costly business with the necessity of biochemicals. On top of that, the low coffee yields could not compensate for those high costs. It meant the end of their career for most farmers. For those with enough capital, giving up coffee to produce tea or cinchona was more feasible. As Money states, it was on the wasted coffee plantations that the Lipton Tea empire took its flight. By cultivating a new cash crop, even out of wastelands, the capitalism of a plantation logic found a way to make a profit.[95]

This chapter has given an insight in how the *H. vastatrix* reproduces through the aerial spread of its spores. It was not surprising that it could thrive on Ceylon's hot and humid monocultures. Strategies to add shade, cultivate in higher and drier regions, and apply chemicals were insufficient to tackle the advancing fungus. These tactics reflect the exertion of colonial biopower to get a hold of the fungus's body. Despite the intensive attempts to kill it, the monocultures kept giving the fungus fertile ground to come alive. Eventually, the coffee business in Ceylon was exchanged for tea.

92 Duncan, *In the Shadows of the Tropics*, 20.

93 Quinan, "Necropolitics," 272.

94 Brown, *The Coffee Planter's Manual*, 181–182.

95 Clarence-Smith and Topik, *The Global Coffee Economy*, 112; Money, *Triumph of the Fungi*, 58.

Conclusion

All things considered, the monocultural plantations are clearly to blame for their own downfall. Behind a plantation logic in Ceylon lies a racist colonial philosophy that put the European human at the centre stage. From the belief that Ceylon's dark forests had to be "enlightened" with European rational science, the British took over the control of its landscape. The manuals from the nineteenth century elaborately describe the process of choosing the right location, radically felling the forest, organising a human and vegetal labour force, and mathematically administering the whole. The governing of human and more-than-human bodies was an inherent part of the British agriculture policy. The bodies of native labourers were violently commodified to serve the colonial interest of a thriving coffee economy. For the same purpose, the science of botany justified coffee plants to be rationally aligned. The long-term health of these plants was subordinate in a plantation logic.

The subsequent fungi epidemic on the plantations gave the coffee farmers a reality check of what it meant to implement monocultures. The poor biodiversity of lands in combination with shadeless fields gave the *H. vastatrix* a fertile ground to spread. Although the reproduction of the fungus was a natural process in itself, the human-made historical conditions that facilitated it should not be neglected. As mycological science developed ways to keep the plantation economy running, this history repeatedly shows how colonialism, science, and capitalism were intertwined. *H. vastatrix* was fought with strategies of shading, moving plantations to higher elevations, and applying biochemicals. However, even under these exertions of biopower, the fungus proved able to adapt. Spreading its countless spores through the wind, the fungus spread quicker than any farmer could have acted. By the late 1880s, the coffee economy of Ceylon was close to an end.

With its focus on the biopolitical governance of living bodies, this paper has revealed the far-reaching consequences of monocultural planting in Ceylon. Regarding the human dimension, the racial ground on which the health of native labourers was damaged reflects an invasive form of colonial biopower. In respect to the more-than-human, this narrative contributes to the historiography in two ways. First, it proves that human actions have a profound effect on both human and more-than-human actors whether plants or fungi. Second and more importantly, it demonstrates how the more-than-human equally influences human behaviour. After all, the evolving survival strategies of the *H. vastatrix* continuously challenged the planters to adapt. From its human-centredness, a plantation logic was clearly not aware of this complex interplay. The analysis of racial and colonial biopower in this essay demonstrates that agency is more complex than it seems at first glance.

Undoubtedly, further research can be done on the link between fungi diseases and coffee production or monocultures in general. Since *H. vastatrix* spread to other coffee regions after devastating Ceylon's plantations, the expression and impact of biopower on other monoculture sites offer an interesting angle. As interesting would be a further exploration of fungal agency. Earlier-cited scientist Nicholas Money is part of a group of mycologists who suggest that fungi might have a consciousness including decision-making capabilities. Its implications for how historians approach human-fungal relationships and for the language historians use to describe this fungal mind deserve their own research.[96]

96 Nicholas Money, "Hyphal and mycelial consciousness: the concept of the fungal mind," *Fungal Biology* 125, no. 4 (2021): 257–259.