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A Parochial Approach: Colonial Entomology on the Plantations of Nineteenth-Century Sri Lanka

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Abstract

The coffee plantations of late nineteenth-century Ceylon (modern-day Sri Lanka) were rocked by a series of crises, including the appearance of numerous insect pests. Scholars have demonstrated that nineteenth-century plantations were both ecologically vulnerable and reliant on exploited labour, with entomology deployed in their defence across the British Empire. Yet this paper argues that, despite its global reach, colonial entomology was sometimes conducted by individuals in pursuit of such parochial concerns as their local reputation and social standing. This case study examines the beetles of Ceylon through the eyes of Scottish plantation owner and amateur naturalist Robert Camperdown Haldane. His 1881 tract *All About Grub* erroneously identified the island's beetles as relatives of the European cockchafer (*Melolontha melolontha*). Although Haldane was a well-travelled individual who adopted a global science, he was also a product of Ceylon's plantation society: touchy about his social status and dismissive of his Indian labourers. The insular priorities of individuals or tight-knit communities could direct an enterprise with superficially global characteristics.

Keywords: Ceylon; classification; entomology; plantations; Sri Lanka

Introduction

In 1871, two descriptions of a troublesome insect appeared in very different parts of the world. The first came from British entomologist E. F. Staveley, who assumed that the cockchafer beetle (*Melolontha melolontha*) was common enough to be universally known among her Western readers. She described the adult form of the insect as “a large beetle, with the forepart of the head curved downwards, with brown wing-cases and sides marked with an angular pattern of black and white.”¹ Swarms of the beetles regularly appeared across Europe, while its larval form, or “white worm,” was a familiar and wearisome pest to nineteenth-century agriculturists. The second description of a damaging insect came from an anonymous British settler on the island of Ceylon (modern-day Sri Lanka). They also described a grub which was, at least superficially, somewhat similar in appearance to the European cockchafer. Their account, published in the local *Ceylon Observer* newspaper, described how a flourishing coffee estate had been destroyed following the appearance of an insect grub in the soil. All efforts to remove the pest had been in

¹ E. F. Staveley, *British Insects* (London: L. Reeve and Co., 1871), 79. For more on Staveley's career, see Mary R. S. Creese, *Ladies in the Laboratory? American and British Women in Science, 1800–1900* (London: Scarecrow Press, 1998), 107.

vain. “Farmers and gardeners at home must have some analogous evil of the kind,” they wrote, “and I intend writing to an experienced nurseryman to see if he can suggest something inimical to grub existence.”² An experienced nurseryman never arrived to deal with the grubs. Instead, this task would be taken up by Robert Camperdown Haldane, a resident planter on Ceylon.

The environment and colonial society of late nineteenth-century Ceylon was in the grip of what has been termed the “plantationocene,” defined by one group of anthropologists as “the devastating transformation of diverse kinds of human-tended farms, pastures, and forests into extractive and enclosed plantations, relying on slave labor and other forms of exploited, alienated, and usually spatially transported labor.”³ Historians have shown that plantations were fragile constructs.⁴ They were vulnerable to cycles of boom and bust driven by changes in trade, markets, the availability of cheap labour, and ecological damage from “soil erosion and longterm fertility loss to pests and diseases.”⁵ Science and technology was not only a means of increasing profitability and efficiency on plantations, but was also deployed in the hopes of saving such systems from collapse. Gregg Mitman has described how Harvard University’s 1926 expedition to Liberia sought to tackle “human and plant diseases [which] threatened labor production and the survival and growth of imported rubber trees.”⁶ Similarly, British coffee plantations in Ceylon were threatened by disease as they moved into the island’s forested highlands. The Indian Ocean had a reputation as a regional hub in which plant diseases were rapidly imported and disseminated via steamships.⁷ Coffee monocultures were also vulnerable to insect pests, hence the appearance of white grubs in 1871 and a settler’s cry for help.

Entomology was one field of science that colonial administrators and settlers sought to harness in defence of the global plantation economy. Despite entomology’s “global” characteristics—the international movement of knowledge and people, application across national boundaries, and a foundation in transnational scientific institutions—this paper argues that entomology could be a decidedly parochial venture in some British colonies.⁸ A decade after the appearance of grubs in coffee estates, Scottish-born planter Robert Camperdown Haldane published *All About Grub*, a short book which identified the Ceylonese grubs as cockchafers and made several suggestions on how to combat

² Anon., “An Alarming Account of Grub on Coffee Estates,” *Ceylon Observer*, 21 February 1871, 12.

³ Donna Haraway, “Anthropocene, Capitalocene, Plantationocene, Chthulucene: Making Kin,” *Environmental Humanities* 6:1 (2015), 159–65.

⁴ Philip D. Curtin, *The Rise and Fall of the Plantation Complex: Essays in Atlantic History* (Cambridge: Cambridge University Press, 1990); and Arnab Dey, *Tea Environments and Plantation Culture: Imperial Disarray in Eastern India* (Cambridge: Cambridge University Press, 2018).

⁵ Corey Ross, “The Plantation Paradigm: Colonial Agronomy, African Farmers, and the Global Cocoa Boom, 1870s–1940s,” *Journal of Global History* 9:1 (2014), 49–71.

⁶ Gregg Mitman, “Forgotten Paths of Empire: Ecology, Disease, and Commerce in the Making of Liberia’s Plantation Economy,” *Environmental History* 22:1 (2017), 1–22.

⁷ Stuart McCook, *Coffee Is Not Forever: A Global History of the Coffee Leaf Rust* (Athens: University of Ohio Press, 2019), 40.

⁸ On the movement of entomology from Britain to its empire, see J. F. M. Clark, *Bugs and the Victorians* (New Haven, Conn.: Yale University Press, 2009), 187–8. On the absence of scientific “expertise” among European planters in Ceylon, see T. J. Barron, “Science and the Nineteenth-Century Ceylon Coffee Planters,” *Journal of Imperial and Commonwealth History* 16:1 (1987), 5–23. The French “Pasteurian empire” of the late nineteenth and early twentieth centuries was also conceived as a global project which subsequently exploited the local landscape of its colonial and scientific world. Aro Velmet, *Pasteur’s Empire: Bacteriology and Politics in France, Its Colonies, and the World* (Oxford: Oxford University Press, 2020). On natural history as a global science, see Helen Anne Curry, Nicholas Jardine, James Andrew Secord, and Emma C. Spary, eds., *Worlds of Natural History* (Cambridge: Cambridge University Press, 2018).

them.⁹ As an investor in the plantation economy, Haldane understood the need to control insect pests.¹⁰ From the mid-nineteenth century, the primary division of entomology was between scientific entomologists and “mere collectors.” Haldane had many of the characteristics applied to a “scientific” entomologist. He collected insects with the goal of controlling them, while simultaneously harnessing experiment and dissection.¹¹ Yet Haldane’s primary concern was to collaborate with, and report to, fellow members of the plantation society in which he was so deeply embedded. He seized upon entomology to promote himself in Ceylonese colonial society.¹² While scholars are familiar with the connection between science and self-promotion, it is intriguing to consider how such interactions shaped the global plantation system.¹³

Our discussion of Haldane’s encounter with the cockchafer beetle occurs in three sections. The first introduces the rise of the plantation economy in Ceylon and its expansion into the forested highlands of the island’s interior over the course of the nineteenth century. The coffee monocultures carved out of the forests turned out to be highly vulnerable to insects. Haldane took it upon himself to act as an entomologist, but only after an early foray into the religious life of Ceylon’s Anglican community was rebuffed. In the second section, we turn to Haldane’s efforts to produce his own classificatory system for Ceylon’s beetles and his encounters with museums to assist with their official naming. The beetles which attacked coffee plantations may have looked like European cockchafers, but they were by no means identical. Haldane’s struggle to impose a classificatory system upon them is a classic example of how “imperial visions” of systematisation and control were “disrupted and defined by local realities.”¹⁴ His hostile reaction to scientific error was a consequence of entomology being bound up with his social standing. Our third section examines Haldane’s efforts to combat insects, including his experiments with noxious pesticides and musings on biological control. All this, however, was insufficient to eradicate the Ceylonese cockchafers. Haldane ended up relying on indentured Indian labourers to bring insect infestations under control.¹⁵ European planters in Ceylon, faced with immediate economic turmoil and plant disease,

⁹ Robert Camperdown Haldane, *All About Grub* (Colombo: A. M. & J. Ferguson, 1881). The Colombo-based Ferguson press produced multiple issues of Haldane’s book, including full colour and black-and-white issues. This article cites Haldane’s personal copy, held in the Cambridge University Library’s Rare Books Collection.

¹⁰ On the Portuguese plantations of São Tomé, Europeans “were simultaneously doing business, making politics, and producing knowledge.” See Marta Macedo, “Standard Cocoa: Transnational Networks and Technoscientific Regimes in West African Plantations,” *Technology and Culture* 57:3 (2016), 557–85.

¹¹ See Matthew Wale, “Editing Entomology: Natural-History Periodicals and the Shaping of Scientific Communities in Nineteenth-Century Britain,” *British Journal for the History of Science* 52:3 (2019), 405–23; Matthew Wale, *Making Entomologists: How Periodicals Shaped Scientific Communities in Nineteenth-Century Britain* (Pittsburgh: University of Pittsburgh Press, 2022). On “amateur” entomology, see Samuel J. M. M. Alberti, “Amateurs and Professionals in One County: Biology and Natural History in Late Victorian Yorkshire,” *Journal of the History of Biology* 34:1 (2001), 115–47.

¹² That Haldane did not seek to publish in natural history periodicals tells us something about his priorities. See Jim Endersby, *Imperial Nature: Joseph Hooker and the Practices of Victorian Science* (Chicago: University of Chicago Press, 2008). On journals and the construction of scientific communities, see Geoffrey Belknap, “Illustrating Natural History: Images, Periodicals, and the Making of Nineteenth-Century Scientific Communities,” *British Journal for the History of Science* 51:3 (2018), 395–422.

¹³ An alternative approach to this study would be to sideline Haldane and focus on more-than-human histories of empire. See, for example, Rohan Deb Roy, “White Ants, Empire, and Entomo-Politics in South Asia,” *Historical Journal* 63:2 (2020), 411–36; and Diogo de Carvalho Cabral, “Meaningful Clearings: Human–Ant Negotiated Landscapes in Nineteenth-Century Brazil,” *Environmental History* 26:1 (2021), 55–78.

¹⁴ Sebastian Kroupa, Stephanie J. Mawson, and Dorit Brixius, “Science and Islands in Indo-Pacific Worlds,” *British Journal for the History of Science* 51:4 (2018), 541–58.

¹⁵ I draw upon two sources for my description of indentured labour in Ceylon: Soma Hewa, “The Hookworm Epidemic on the Plantations in Colonial Sri Lanka,” *Medical History* 38:1 (1994), 73–90; and James S. Duncan, *In the Shadows of the Tropics: Climate, Race and Biopower in Nineteenth Century Ceylon* (Aldershot: Ashgate Publishing, 2007).

substituted tea for coffee as the island's main cash crop. Taken together, this paper argues that Haldane used colonial entomology as a means of securing his social status. By acknowledging this, we can better understand his science.

Deforestation, Natural History, and Robert Haldane

The environmental history of nineteenth-century Ceylon can be summarised as mass deforestation to provide new land for a plantation economy.¹⁶ The British East India Company had seized the coast of Ceylon from the Dutch in 1796 and held it until 1804, when Ceylon was declared a crown colony. Subsequent wars with local rulers gave the British control of the highland interior of the island, with large scale coffee production beginning in 1825.¹⁷ For British planters, the highland forests were an obstacle to be removed. James Emerson Tennent, colonial secretary of Ceylon from 1845 to 1850, claimed that the “only spots hitherto found suitable for planting coffee, are those covered by the ancient forests of the mountain zone.”¹⁸ For visitors to Ceylon, the sight of falling or felled trees was soon commonplace. William Knighton, who spent four years in Ceylon running a coffee plantation and newspaper, initially praised British administrators of the island. He viewed the opening up of the island's interior to roads and agriculture as evidence of the advance from “barbarism to civilisation,” as a managed landscape replaced “imperious forests, in which the elephant, the cheetah and the wild cat roamed undisturbed.”¹⁹ The “progress” so admired by Knighton almost came to a halt in 1846, when an economic depression caused a fall in coffee prices and social unrest.²⁰

Although coffee plantations survived, their renewed “progress” came with a heavy environmental and ecological toll. While on a journey from the town of Gampola, Knighton noted that the most striking aspect of the local scenery now came from “a lamentable devastation, caused by coffee and its cultivators.” All around him, tropical trees of “magnificent size and appearance” had been felled and left to decay.²¹ Disaster struck the plantation economy in 1869 when a fungal disease, *Hemileia vastatrix*, all but destroyed the industry. The disease attacked the leaves of coffee trees. Hawaiian-born journalist Henry Martyn Whitney described how planters considered abandoning their estates, hoping for a better year and “a prospect of a new order of things.” Their patience was rewarded as the blight lessened in its intensity, allowing the coffee industry to flourish once again. Whitney described the post-blight Dimbula estate in Ceylon as “the largest sheet of unbroken coffee in the world.”²² Subsequent imperial histories of Ceylon would tell a very different story, with British commentators arguing that the ingenuity and industry of their tea planters had intervened to save Ceylon's economy in the wake of the coffee blight. In reality, the coffee plantations lingered on for over a decade.²³

¹⁶ See J. L. A. Webb, Jr., *Tropical Pioneers: Human Agency and Environmental Change in the Highlands of Sri Lanka, 1800–1900* (Athens: Ohio University Press, 2002); and Roland Wenzlhuemer, *From Coffee to Tea Cultivation in Ceylon, 1880–1900: An Economic and Social History* (Leiden: Brill, 2008).

¹⁷ John Ferguson, *Ceylon in the Jubilee Year* (London: John Haddon & Co., 1887), 61.

¹⁸ James Emerson Tennent, *Ceylon: An Account of the Island*, 4th ed. (London: Longman & Co., 1860), 24.

¹⁹ William Knighton, *The History of Ceylon, from the Earliest Period to the Present Time* (London: Longman, Brown, Green & Longmans, 1845), 261.

²⁰ Russell R. Ross and Andrea Matles Savada, “Sri Lanka: A Country Study,” in *Sri Lanka: Current Issues and Historical Background*, ed. Walter Nubin (New York: Nova Science Publishers, 2002), 77–220. For a case study on the impact of fluctuating coffee prices, see David Hyde, “Paying for the Emergency by Displacing the Settlers: Global Coffee and Rural Restructuring in Late Colonial Kenya,” *Journal of Global History* 4:1 (2009), 81–103.

²¹ Knighton, *History of Ceylon*, 379.

²² H. M. Whitney, *The Hawaiian Coffee Planters' Manual* (Honolulu: Hawaiian Gazette Company's Press, 1894), 40.

²³ Erika Rappaport, *A Thirst for Empire: How Tea Shaped the Modern World* (Princeton, N.J.: Princeton University Press, 2017), 161. The coffee plantations were ultimately brought down by a “combination of economic and environmental crises.” McCook, *Coffee Is Not Forever*, 58.

European naturalists, including those interested in entomology, had visited Ceylon on several occasions. The island was also home to a botanic garden, supposedly founded in 1822 in Peradeniya. However, the botanic garden was built on the historic site of a Kandyan temple garden, suggesting that the British engaged in “recycling” existing knowledge and sites of natural history for their own purposes.²⁴ The garden expanded over the late nineteenth and early twentieth centuries, with its scientific community erecting a laboratory and hosting visiting botanists. A museum was also built.²⁵ Zoology, however, lacked an institutional setting. “It is a singular fact,” wrote the forester Arthur Willey in 1903, “always excepting Japan, that the study of zoology has not obtained a firm footing in the East.” In fact, by the time Willey wrote this line in his unpublished “Natural History in Ceylon,” the island did host a course in elementary biology at its medical college and possessed a Marine Biology Department.²⁶ Haldane and his encounter with the beetles of Ceylon, however, came too early to benefit from these institutional fixtures. In 1881, there were no dedicated entomological institutions in the British Empire—economic or otherwise—to which Haldane could turn.

Robert Camperdown Haldane arrived in Ceylon after the worst of the coffee blight had passed. Haldane came from the upper circles of nineteenth-century British society. Members of his family held positions in local government, with his half-brother Richard being elevated to the peerage in 1911 and holding the position of Lord Chancellor on two occasions. Our Haldane attended Loretto School in Edinburgh, founded by Reverend Thomas Langhorne, a Scottish Episcopalian minister.²⁷ Haldane had arrived in Ceylon by the early 1870s, where his name appeared in a list of subscribers to a fund for the widow of local coconut planter R. Davidson.²⁸ This list appeared in the *Ceylon Observer*, published in Colombo. The newspaper would chart the fortunes and failures of Ceylon’s planters and formed the first port of call when Haldane wished to report on his natural history investigations. Its printers were even responsible for the production of his *All About Grub* pamphlet, which appeared in several versions after its initial publication in 1881.

Yet Haldane’s relationship with the newspaper got off to a shaky start. A Conservative and advocate of the High Church tradition within Anglicanism, Haldane wrote to the paper in the summer of 1876 to defend an unpopular local bishop. The Anglican Church in the nineteenth-century British Empire was “an amorphous entity,” home to many competing traditions and authorities.²⁹ Haldane’s intervention in religious affairs brought a scathing response from an anonymous opponent in the *Ceylon Observer*. Unfortunately for Haldane, he had the same name as the famous Scottish theologian and writer Robert Haldane. This connection provided his anonymous detractor with ample opportunity for mockery. They noted that this branch of the Haldane family stretched far away from that of his independently minded forebear, memorably labelling

²⁴ Sujit Sivasundaram, *Islanded: Britain, Sri Lanka, and the Bounds of an Indian Ocean Colony* (Chicago: University of Chicago Press, 2013), 182–5.

²⁵ John C. Willis, “An English Station for Botanical Research in the Tropics (Ceylon),” *Nature* 61 (1899), 32–4; Eugenia W. Herbert, “Peradeniya and the Plantation Raj in Nineteenth-Century Ceylon,” in *Eco-Cultural Networks and the British Empire: New Views on Environmental History*, ed. James Beattie, Edward Melillo, and Emily O’Gorman (London: Bloomsbury Academic, 2015), 123–50.

²⁶ Arthur Willey, “Natural History in Ceylon,” 7 September 1903. Arthur Willey: Correspondence and Papers, Cambridge University Library Special Collections, Add. 9914/20.

²⁷ Charles Mosley, ed., *Burke’s Peerage, Baronetage and Knightage*, 107th ed. (Wilmington: Burke’s Peerage (Genealogical Books) Ltd., 2003), 1724.

²⁸ Anon., “The Davidson Fund,” *Ceylon Observer*, 24 January 1872, 6.

²⁹ Joseph Hardwick, *An Anglican British World: The Church of England and the Expansion of the Settler Empire, c. 1790–1860* (Manchester: Manchester University Press, 2014), 240.

the modern Haldane “the sucking planter of Dimbula.”³⁰ This was Haldane’s first and only foray into the religious life of Ceylon. We can imagine that the young planter would be more than a little dissatisfied if “sucking planter” characterised his reputation within the European community. If religion was not a route into the local affairs of Ceylon, however, authority and respect could also be gained in the interconnected worlds of commerce and science.

When he stayed out of ecclesiastical affairs the young Haldane was an active member of the European community in Ceylon. He began his career as a plantation owner by growing coffee and cinchona.³¹ In the same year that Haldane clashed with the *Ceylon Observer*, he attended his first meeting of the Dimbula Planters’ Association, which voted in favour of railway improvement and mulled over a clash between the British governor and local systems of land organisation and management.³² He apparently first encountered the cockchafer beetle in the form of grey grubs about one-fifth of an inch long on his Dimbula estate in 1880. He immediately called a halt to all other work, ordering the indentured labourers assigned to his estate to remove grubs from the earth with wooden pegs and place them in coconut shells. The grubs met a sticky end when Haldane immersed them in boiling water.³³ He described the life cycle and habits of the grub in a letter published in the *Ceylon Observer*, claiming “I do not set myself up as an authority on the subject: on the contrary, I would only be too glad to learn more myself from others.”³⁴ Haldane saw that the grubs turned white in colour and grew increasingly active as they matured, gnawing the roots of his coffee trees with their mandibles. They were particularly attracted, he noted, to decaying timber. The grubs first appeared in May, slowly maturing and creating a cocoon in the first months of the next year. A short time later, “the perfect cockchafer” emerged from the cocoon and took to the skies, ready to lay its eggs and begin the cycle over again.³⁵

His encounter with cockchafer beetles and their attacks on his coffee trees led Haldane to produce *All About Grub* the following year. Haldane argued that entomology and the cockchafer grubs were a very different field of inquiry from the fungal leaf disease which had previously blighted Ceylonese coffee. The leaf disease, he argued, was a “subject requiring laborious microscopic investigation by trained scientific men.” In contrast, study of the cockchafer beetle required “a year or two of accurate observation in studying the habits and natural history of the beetles and their larvae, and offering but a light task to any friend of the coffee tree.”³⁶ This claim was not entirely truthful, as Haldane was also able to access a small collection of books to inform his study of the cockchafer beetle. In the appendix to *All About Grub*, he listed several texts from “leading entomologists,” to whose “works I have had access since writing the above.”³⁷ On the life cycle of the cockchafer, for instance, he cited the work of Richard Owen, English palaeontologist and comparative anatomist. Owen had referenced the cockchafer during his twenty-four lectures

³⁰ R. C. Haldane, “Mr. R. C. Haldane’s Opinions,” *Ceylon Observer*, 29 August 1876, 8; Anon, “A Degenerate Stock of Worthy Scion,” *Ceylon Observer*, 29 August 1876, 5.

³¹ R. C. Haldane, “Planting Activity in the West,” *Ceylon Observer*, 4 August 1883, 7.

³² Anon, “The Dimbula Planters’ Association,” *Ceylon Observer*, 24 June 1876, 16.

³³ On the troubling relationship between natural history knowledge and labour, see Patrick Anthony, introduction to “Working at the Margins: Labor and the Politics of Participation in Natural History, 1700–1830,” *Ber. Wissenschaftsgesch* 44 (2021), 115–36.

³⁴ R. C. Haldane, “Enemies of the Coffee Tree: The White Grub,” *Ceylon Observer*, 7 December 1880, 5. This modesty was standard rhetoric.

³⁵ Haldane, “Enemies of the Coffee Tree,” 6.

³⁶ Haldane, *All About Grub*, 9.

³⁷ Haldane, *All About Grub*, 23.

at the Royal College of Surgeons in London.³⁸ He had used the cockchafer beetle to discuss the nature of development, describing how the “larvae of the cockchafer typify the earthworm in their habits, and continue for three years burrowing in the soil and devouring the roots of grass and other vegetables.”³⁹

Owen was just one part of Haldane’s library. It also included classical natural history texts like William Jardine’s *The Naturalist’s Library*, which included contributions by Scottish naturalist James Duncan on entomology. Haldane turned to Duncan for information on how insects mated and laid their eggs, citing a passage describing how insect eggs were fertilised as they passed down the egg canal.⁴⁰ Such arguably superfluous information may have been an attempt by Haldane to appeal to authority and demonstrate some basic knowledge of entomology. Other books, such as James Brown’s *The Forester*, dealt more directly with the business of planting and maintaining trees. In 1854, Brown became president of the Scottish Arboricultural Society, marking the emergence of a class of “professional estate foresters,” whose members would go on to secure top jobs in the Indian Forest Department.⁴¹ Brown marketed his own book on arboriculture, which went through six editions from 1847 to 1894, as a practical and accessible guide to forest management.⁴² Proper care of trees and the soil, argued Brown, could stave off harmful insects. “It may be noticed here,” he wrote in the fifth edition, “that where the land is in a proper condition for the healthy growth of trees, and where the kinds are properly suited to the land, very little harm is found to arise from insect attacks on them.”⁴³

Whether the typical coffee planter in Ceylon had the means to afford a small library, or the time to make use of it, is questionable. This did not stop the *Ceylon Observer*, which printed Haldane’s work, producing a list of books recommended for every tropical planter in 1884. The list was extensive, running to over twenty volumes, all handily available upon request to the newspaper’s offices or agents.⁴⁴ In addition to his stock of books from Europe, Haldane was also able to travel across the British Empire, gathering contacts and viewing alternative means of cultivation. As the coffee industry declined in Ceylon, he promoted Jamaica in its stead. In 1883, Haldane visited Jamaica and declared the island suitable for “steady and energetic” planters with the “small” amount of a thousand pounds spare capital.⁴⁵ He would go on to participate in Ceylon’s growing tea industry and offered timber from New Zealand to Ceylonese planters for building tea crates.⁴⁶ These subsequent business opportunities confirm that Haldane was a privileged individual, with the ability and leisure time to travel internationally and engage in natural history. His book was well received by his fellow planters. An anonymous review in the

³⁸ Nicolaas Rupke, “Richard Owen’s Hunterian Lectures on Comparative Anatomy and Physiology, 1837–55,” *Medical History* 29:3 (1985), 237–58.

³⁹ Richard Owen, *Lectures on the Comparative Anatomy and Physiology of the Invertebrate Animals* (London: Longman, Brown, Green, & Longmans, 1843), 241–2. Haldane’s citation of Owen’s “comparative anatomy” does not match the text of the Hunterian lecture, suggesting he possessed a published summary or abstract.

⁴⁰ James Duncan, *The Naturalist’s Library: Introduction to Entomology*, vol. 1 (Edinburgh: W. H. Lizars, 1840), 190. Venturing into the field of insect mating could be a risky business, as common cockchafers had caused some controversy among naturalists. See R. Brooks, “All Too Human: Responses to Same-Sex Copulation in the Common Cockchafer (*Melolontha melolontha* (L.)), 1834–1900,” *Archives of Natural History* 36:1 (2009), 146–59.

⁴¹ K. Jan Oosthoek, *Conquering the Highlands: A History of the Afforestation of the Scottish Uplands* (Canberra: Australian National University E Press, 2013), 36.

⁴² N. D. G. James, “A History of Forestry and Monographic Forestry Literature in Germany, France, and the United Kingdom,” in *The Literature of Forestry and Agroforestry*, ed. Peter McDonald and James Lassoie (Ithaca, N.Y.: Cornell University Press, 1996), 15–44.

⁴³ James Brown, *The Forester*, vol. 1, 5th ed. (Edinburgh: William Blackwood and Sons, 1882), 715.

⁴⁴ Anon., “Books of Which Every Tropical Planter Ought to Have a Copy,” *Ceylon Observer*, 15 November 1884, 1.

⁴⁵ Haldane, “Planting Activity in the West,” 7.

⁴⁶ R. C. Haldane, “Wood for Tea Boxes,” *Ceylon Observer*, 22 June 1887, 13.

Tropical Agriculturist, the magazine of the Ceylon Agricultural Society, welcomed Haldane's foray into entomology. "On the whole," wrote the reviewer, "Mr. Haldane must be congratulated on giving his attention to the subject and noting down so carefully his observations."⁴⁷ When compared to Haldane's intervention in ecclesiastical affairs, this was a generous reception.

The dramatic expansion of the plantation economy in Ceylon followed a familiar pattern. A study of the early twentieth-century expansion of coffee plantations in the Brazilian state of São Paulo has identified three aspects of such growth. The first was the extension of railways which, as in Ceylon, allowed the expansion of cultivated land whilst maintaining profitability. The second was the availability of cheap labour, provided by subsidised immigration in São Paulo and indentured labour in Ceylon. Third, despite the expansion of plantations, the techniques and technology involved in growing and harvesting coffee remained rudimentary.⁴⁸ Ceylonese plantations did not adopt new means of disease or pest control and did not have ready access to entomological institutions or expertise.⁴⁹ Taken together, these characteristics provided the perfect storm for insect infestations to inflict maximum damage on plantations. The forest habitat of beetles had been destroyed and replaced with coffee monocultures, which were only profitable thanks to low transport and labour costs. When the displaced insects took advantage of this new food source, European settlers had neither the financial nor technological means to combat them. Into this void stepped Haldane. As an investor in the plantation economy, whose intervention into the local religion and politics of colonial Ceylon had not been well received, entomology offered him the opportunity to simultaneously combat an economic threat and gain status among the European community on the island.

The Origins and Identity of the Ceylon Cockchafers

Battling swarms of insects, whether known or new to science, was no easy task for nineteenth-century growers. Once a swarm of insects arrived on the farm or plantation, there was no guaranteed way to be rid of them. Identifying and understanding the origins of these insect pests was therefore a pressing concern for entomologists. For the European authors listed among Haldane's colonial library, a clear relationship existed between infestations of cockchafers and changes to the environment. One of the most vocal proponents of this train of thought was the French scientist Louis Figuier, who observed that the cockchafer preferred to lay its eggs in soil with all the characteristics of well-tended arable land: soft, ventilated, well-manured, and fertile. "We may conclude from this," he wrote, "that cultivation and labour have made the cockchafer more common than it was formerly."⁵⁰ He argued that agriculture and cockchafer numbers were indelibly linked. The insect was a "child of civilization, the parasite of agriculture."⁵¹ Haldane also cited the sixth volume of the *Encyclopaedia Britannica*, which described the common cockchafer as "one of the commonest and most destructive of beetles" and repeated the observation that the beetle "spread with the progress of agriculture."⁵²

⁴⁷ Anon., "All About the Coffee Grub," *Tropical Agriculturist and Magazine of the Ceylon Agricultural Society* 1 (1882), 720–1.

⁴⁸ Francisco Vidal Luna, Herbert S. Klein, and William Summerhill, "The Characteristics of Coffee Production and Agriculture in the State of São Paulo in 1905," *Agricultural History* 90:1 (2016), 22–50.

⁴⁹ Planters conducted numerous experiments to control the coffee blight well into the 1880s. See McCook, *Coffee Is Not Forever*, 56.

⁵⁰ Louis Figuier, *The Insect World; Being a Popular Account of the Orders of Insects, Together with a Description of the Habits and Economy of Some of the Most Interesting Species* (New York: D. Appleton & Co., 1868), 451.

⁵¹ *Ibid.*

⁵² Haldane, *All About Grub*, 29–30.

In late nineteenth-century Ceylon, planters held that deforestation and the expansion of agricultural land was responsible for creating larger swarms of harmful beetles. In the opening pages of *All About Grub*, Haldane introduced his readers to the insights of Mr. Smith of Mattakelly, who had helped him find and observe beetles, on the origins of the pest in Ceylon. “We have gone on felling jungle and planting the land with a suitable food for the larvae of beetles,” proclaimed Smith, “and where food exists there will animal life, from the highest to the lowest forms, most rapidly increase.” He partly blamed easy access to food (in the form of coffee) for an increase in cockchafer numbers, but also pointed to unfavourable weather conditions. The “excessive rainfall of the last four years,” claimed Smith, “has loosened the soil and made it easier for both beetles and grubs to bury themselves in it.” He theorised that Ceylon’s soil had become alkali-deficient, subsequently providing a “suitable locality” for cockchafer eggs and grubs.⁵³ Haldane concurred with Smith, telling his readers that cockchafers preferred lighter soils with a high concentration of vegetable matter. “I have always found most grubs in a rich chocolate earth,” he wrote, “particularly in the rich soil of the Maskeliya estates.” Haldane also observed that land littered with decaying timber seemed especially attractive to grubs. The expansion of the cockchafer beetle in Ceylon was not helped, argued Haldane, by his fellow planters who abandoned infested coffee plantations. “I regret to say,” Haldane wrote, “that there is too much coffee of this sort in the country. Some planters grow despondent and say it is useless to contend with the pest.”⁵⁴ Deforestation and abandoned plantations, when combined with changes to soil and the climate, offered beetles and their grubs the perfect setting in which to flourish.

Identifying the various grubs and beetles on coffee plantations was no easy task, however, particularly for someone who lacked any previous experience in entomology. Haldane did consult the work of former colonial secretary of Ceylon James Tennent, who claimed there were six different species of cockchafer on the island. He gave so few details on these beetles, however, that Haldane felt unable to identify them.⁵⁵ When Haldane first dispatched his coloured sketches of the beetles and their larvae to the *Ceylon Observer* in the winter of 1880, he confessed that he was “doubtful of the identity of some of the beetles.” The newspaper passed the illustrations to the curator of Ceylon’s museum, who met with “only partial success,” matching the illustration numbered eight to a “clinteria,” or rose chafer, in the museum’s collection.⁵⁶ With no expert confirmation forthcoming, Haldane pressed ahead with his own classificatory scheme, naming the beetles based on their physical characteristics or where he had first observed them. He claimed to have seen six different varieties of cockchafer and two other species of beetle which damaged coffee trees.

Of all the beetles in Ceylon, Haldane considered the big patana cockchafer to be the “most destructive of all our Ceylon cockchafers” (Figure 1). He described the beetles as flying during the day and early evening while making “a loud humming noise.”

⁵³ *Ibid.*, 10. Ceylon’s high rainfall was also responsible for turning the island into “a vast incubator for the coffee rust” which struck in 1869. See McCook, *Coffee Is Not Forever*, 39.

⁵⁴ Haldane, *All About Grub*, 10–11.

⁵⁵ *Ibid.*, 17.

⁵⁶ Anon, “White Grub in Coffee,” *Ceylon Observer*, 19 December 1880, 28. Curators of some colonial museums possessed extensive professional networks, which included British zoologists and curators at the British Museum. Haldane may have been directed to the latter following his visit to the Ceylonese museum. The failure of his illustrations may also have spurred him towards collecting specimens. See Savithri Preetha Nair, “Edgar Thurston at the Madras Museum (1885–1909): The Multiple Careers of a Colonial Museum Curator,” in *Curating Empire: Museums and the British Imperial Experience*, ed. Sarah Longair and John McAleer (Manchester: University of Manchester Press, 2016); *Sri Lanka: Current Issues and Historical Background*, ed. Walter Nubin (New York: Nova Science Publishers, 2017), 168–87.

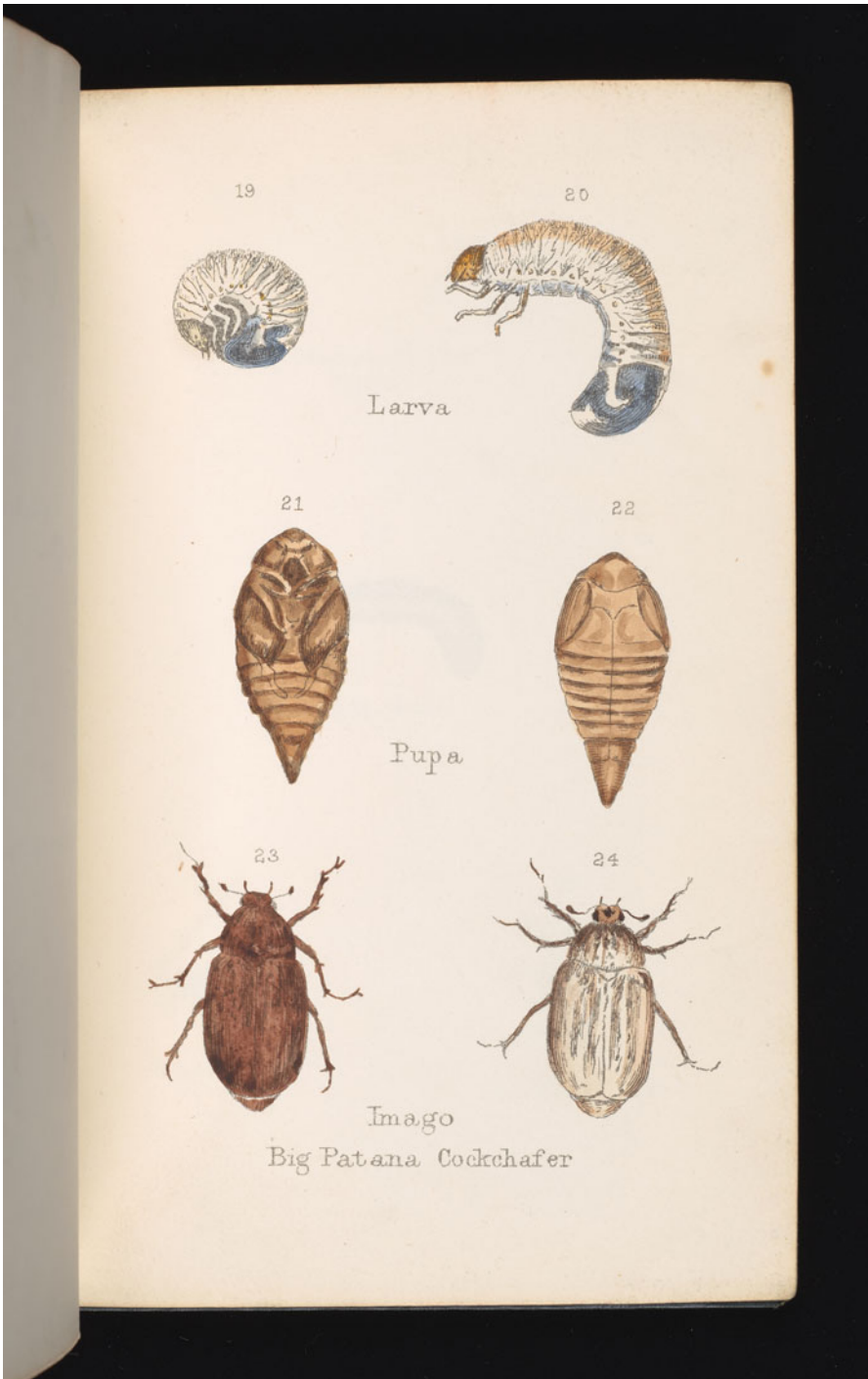


Figure 1. Haldane described the big patana cockchafer (the life cycle of which is depicted above) as the most destructive beetle he encountered in Ceylon. From Robert Camperdown Haldane, *All About Grub* (Colombo: A. M. & J. Ferguson, 1881). Syn.6.88.250. Reproduced by kind permission of the Syndics of Cambridge University Library.

Depending on their sex, the big patana cockchafer was either chestnut coloured with patches of black, or a “dirty white.” Haldane gruesomely ascertained the beetles’ sex by squeezing out their entrails to check for testes. Planters in Ceylon claimed a single grub of this beetle could destroy an entire coffee tree by attacking its roots. Haldane observed the insect through every stage of its life cycle—grub, pupa, and beetle—thanks to “the kind courtesy of Mr. Smith of Mattakelly [plantation].”⁵⁷

Observing other beetles involved more effort, notably the Maskeliya cockchafer, which Haldane described as being about an inch long and dark brown with small yellow or white spots (Figure 2). They were nocturnal and rested on the leaves of coffee trees during the day. Haldane depicted them as more resembling “the common Cockchafer of Europe (*M. vulgaris*) than any species I have met with in Ceylon.” Although he did not encounter any beetles around the Dimbula estates, Haldane was informed that a planter in Maskeliya had raised the beetles from “the white grub which infests his district.” The most common insect Haldane encountered was the small cockchafer, a minute beetle which was a “dark copper brown” in colour and flew at night in “countless numbers.” Haldane recorded that the beetle could easily be shaken off trees during the day. He also noted that each female beetle laid from twenty-five to thirty eggs.⁵⁸

Other varieties of beetle presented Haldane with ever greater degrees of difficulty when it came to their classification. The yellow-bellied cockchafer, for instance, which Haldane described as less destructive than other cockchafer varieties, proved to be a source of some embarrassment. Haldane described them as chestnut coloured with a yellow under-thorax. Referring to his library, he noted, “In works of Natural History, the white grub is described as the larva of the cockchafer, and the grey grub as the larva of the rosechafer or cetonia.” Yet when he tried to raise some grey grubs and dissected their pupae in front of the Dimbula Planters’ Association, some of them turned out to be yellow-bellied cockchafers (Figure 3). Haldane’s natural history books had decreed that cockchafers would only form from white grubs. Haldane was clearly shaken, dubiously asserting in print that “some one tampered with my experiment.”⁵⁹ This accusation can be understood in the context of social embarrassment. Haldane had based his place in the plantation society of Ceylon on entomology. To make such a public error in front of his peers at the Dimbula Planters’ Association must have been a bitter pill to swallow. In a later 1881 letter to the *Ceylon Observer*, Haldane would abandon the tampering accusation and confessed that “all my former ideas on the subject are shaken, and I am inclined to think that the parent of the white grub has yet to be identified.”⁶⁰

Haldane did not describe all the beetles he encountered in Ceylon as cockchafers. He recognised, for instance, that the speckled beetle was a not a “true cockchafer” but a member of the *Cetonia* genus of beetles. It was, however, “as great an enemy of coffee as any of the beetles I have described.” The beetle flew during the day and devoured the blossoms of coffee trees. Its grubs, like those of cockchafers, attacked the roots of coffee. These grubs were grey and their pupae hatched in the batch of insects Haldane presented to the Dimbula Planters’ Association. “These beetles,” Haldane claimed, “are closely allied to the common rosechafer of England.”⁶¹ He would later request that anybody who could give him “the proper name of the speckled beetle” do so.⁶² Haldane included beetles which were not economically damaging in his classificatory scheme.

⁵⁷ Haldane, *All About Grub*, 17–18.

⁵⁸ *Ibid.*, 19–20.

⁵⁹ *Ibid.*, 19.

⁶⁰ R. C. Haldane, “Enemies of Coffee: Mr. Haldane’s Experiments in Investigating the Coffee Grub,” *Ceylon Observer*, 7 March 1881, 3.

⁶¹ Haldane, *All About Grub*, 20–1.

⁶² Haldane, “Enemies of Coffee,” 3.

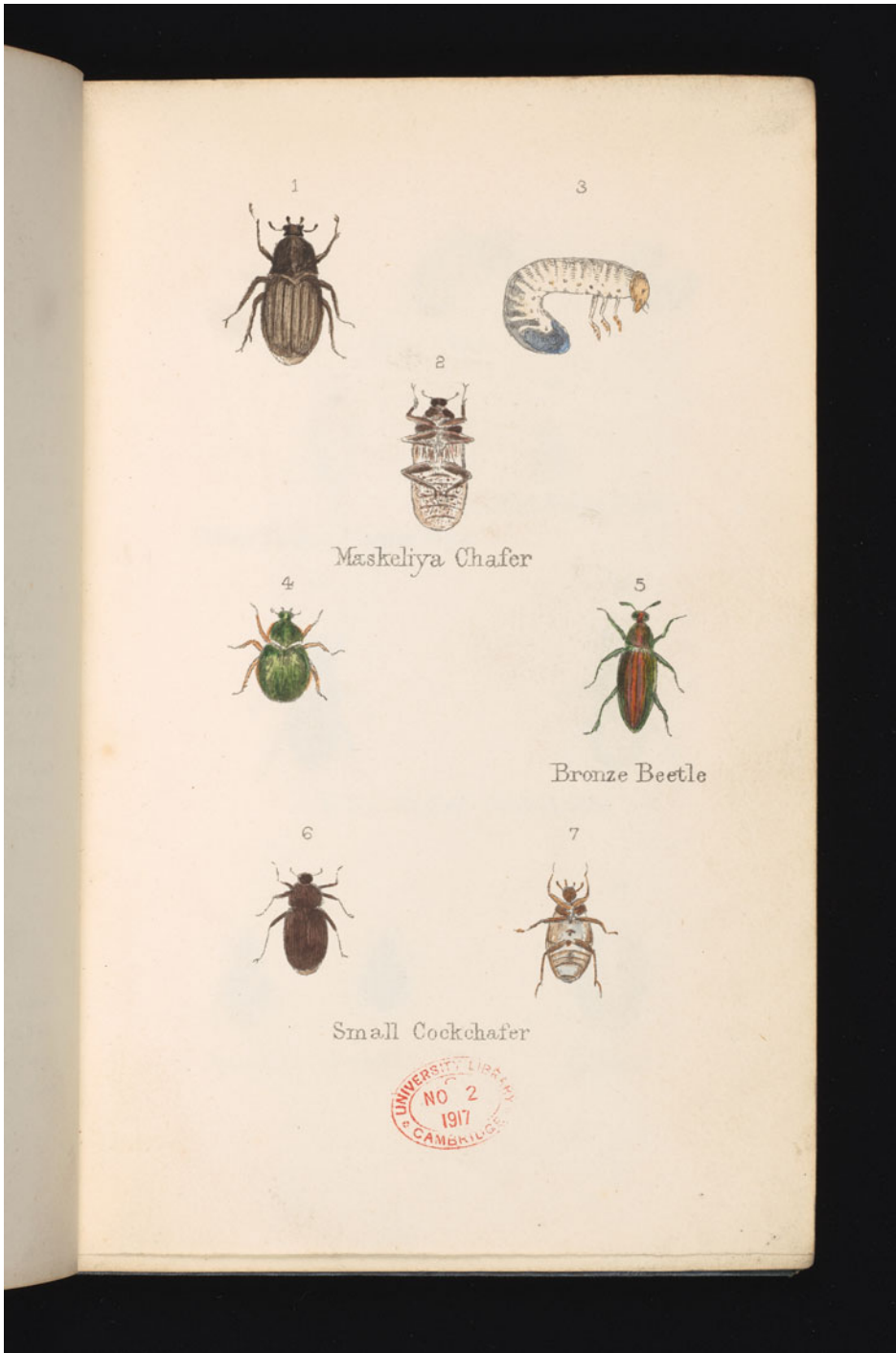


Figure 2. A selection of the beetles encountered by Haldane in Ceylon. Note the appearance of the white grub of the Maskeliya cockchafer (no. 3). From Robert Camperdown Haldane, *All About Grub* (Colombo: A. M. & J. Ferguson, 1881). Syn.6.88.250. Reproduced by kind permission of the Syndics of Cambridge University Library.



Figure 3. When Haldane hatched yellow-bellied cockchafers (nos. 13-14) from grey grubs (nos. 8-10), his faith in European natural history was shaken. From Robert Camperdown Haldane, *All About Grub* (Colombo: A. M. & J. Ferguson, 1881). Syn.6.88.250. Reproduced by kind permission of the Syndics of Cambridge University Library.

He did not bother to obtain much information on the Uva cockchafer, which he only encountered in the district of Uva. Haldane's lack of interest stemmed from the fact that he had never observed the beetle around coffee trees and therefore did not consider it a threat to plantations. Another insect which seemed to pose little threat was the bronze beetle. Under this name, Haldane discussed a beetle he assigned to the Buprestidae family which "probably does no harm." He also referenced a mysterious member of the *Cetonia* genus which he claimed was common to the Maskeliya district. Unlike the Uva cockchafer or the bronze beetle, however, this insect resembled the more destructive cockchafers by emerging from a white grub and "must therefore be considered destructive."⁶³

It is evident that Haldane's efforts to describe and classify the agriculturally harmful beetles of Ceylon came from the perspective of a planter, not a naturalist. He developed a taxonomy of utility for the use of his fellow Europeans, one which did not respect ancestral groupings or details of form. Rather, this taxonomy separated species on their general appearance, behaviour, and life cycle: all traits which could be identified by European planters and used in insect control. For Haldane, linking beetles with their grubs was particularly important. Accomplishing this would provide planters with the ability to preemptively spot and counter insects, attacking them before they grew or killing beetles before they laid their eggs.⁶⁴ Yet Haldane seemingly made no effort to engage with his Indian labourers or local villagers in Ceylon to help him identify beetles or collect specimens.⁶⁵ He instead relied heavily upon his library of European naturalists, an approach which backfired when he hatched the "wrong" beetles from pupae at the Dimbula Planters' Association.

Haldane's difficulty identifying beetles would not necessarily be taken as evidence of "amateurism" by his peers. Later in the century, economic entomologists in the British Empire avoided the classificatory dilemmas faced by Haldane altogether by arguing "that the naming of insects was best left to metropolitan museum staff who were accustomed to working with dead specimens."⁶⁶ Following the publication of *All About Grub*, Haldane returned to London and met with Charles Waterhouse, Entomological Curator at the British Museum. Waterhouse examined Haldane's specimens and confirmed that the bronze beetles were members of the Buprestidae family. He also suggested that the Maskeliya cockchafer and small cockchafer were new varieties of insect unknown to science. Unfortunately for Haldane, however, neither his classificatory scheme nor his insect collection stood up to professional scrutiny. The dry insect specimens that Haldane presented to Waterhouse were not suitable for "careful examination" through dissection. "Waterhouse," wrote a suitably chastised Haldane, "in subsequent conversation, pointed out the importance of furnishing the Museum with specimens in spirits."⁶⁷

Haldane faced a myriad of struggles in his efforts to identify the beetles he encountered on or around coffee estates. Even trained entomologists were content to avoid the difficult work of classification by sending their specimens to institutions like the

⁶³ Haldane, *All About Grub*, 21.

⁶⁴ For a comparable entomological case where the life cycles of insects took centre stage, see Kay Etheridge, *The Flowering of Ecology: Maria Sibylla Merian's Caterpillar Book* (Leiden: Brill, 2021).

⁶⁵ Cooperation with the latter would admittedly have been difficult due to the legacy of the violent British assault on the Kandyan kingdom.

⁶⁶ Clark, *Bugs and the Victorians*, 200. On the movement of natural history specimens, see Anne Coote, Alison Haynes, Jude Philp, and Simon Ville, "When Commerce, Science, and Leisure Collaborated: The Nineteenth-Century Global Trade Boom in Natural History Collections," *Journal of Global History* 12:3 (2017), 319–39.

⁶⁷ R. C. Haldane, "The Cockchafer Grub and Maskeliya Cockchafer: Specimens Wanted for the British Museum," *Ceylon Observer*, 25 February 1882, 27.

British Museum. One critique of existing studies of colonial science is that they simplistically tend to assume that “problems inevitably precede the solutions they tend to necessitate.”⁶⁸ In the case of Haldane, it was more that he found what he believed to be a pre-existing European problem—the cockchafer beetle—in Ceylon, which then determined his approach to insect identification. His lack of interaction with other entomologists was also evident in his simplistic system of beetle classification, which did not fit with the norms of taxonomy. Instead, it was a practical system developed by one planter for others. For every beetle or grub he encountered, Haldane endeavoured to record its geographical location, the details of its life cycle and whether it posed a threat to coffee estates. This led Haldane to his next problem: how to combat beetles in a colonial setting.

Biology, Chemistry, and Labour

In the nineteenth century, insect control resembled a toolkit of different theories and techniques. There was certainly no shortage of methods to counter the cockchafer beetle among the books in Haldane’s library: in John Claudius Loudon’s classic work *The Suburban Horticulturalist*, for instance. For many growers across the British Empire, the Scottish horticulturalist John Loudon was the go-to authority for all things gardening. His works were well known in British colonies such as Australia, where Loudon was read and admired by civil servants, garden designers, and naturalists.⁶⁹ Haldane may have had access to the original text of Loudon’s *Suburban Horticulturalist*, or to a revised edition released by Irish horticulturalist William Robinson in 1871.⁷⁰ To redirect unwanted pests, Loudon suggested his readers might entice insects to lay their eggs in “boxes, or large pots, filled with rotten tan [tanning bark], sunk in the soil,” from where they could be easily collected and destroyed. Alternatively, covering the soil with straw could prevent them laying their eggs in the first place.⁷¹ If any of Haldane’s sources were familiar to his audience of British coffee growers in Ceylon, Loudon would surely have been among them. Haldane expressed his hope that “both of the above preventatives shall be tried by some of my readers.”⁷² Of course, there was no guarantee that Loudon’s suburban remedies would work on larger plantations.

John Curtis, an English entomologist employed by the Royal Agricultural Society of England and Wales during the mid-nineteenth century, was another source of inspiration for Haldane. One of Curtis’s suggestions in his *Farm Insects* was to spread the ashes of burnt peat over grub-infested soil. Rain caused sulphuric acid to leech out of the ashes and destroy cockchafer grubs. Haldane also noted that the “same authority [Curtis] advises ploughing the fields in autumn to enable birds to see the grub. He also says that children should turn over the clods and catch them, and recommends catching the beetles in nets.”⁷³ Haldane also devoted significant space to the work of Thaddeus William Harris, an American entomologist and botanist at Harvard. Based on a state-sponsored natural history of Massachusetts, Harris’s 1862 book *A Treatise on Some of the Insects Injurious to Vegetation* paid close attention to the concerns of agriculturalists.⁷⁴

⁶⁸ Rohan Deb Roy, *Malarial Subjects: Empire, Medicine and Nonhumans in British India, 1820–1909* (Cambridge: Cambridge University Press, 2017), 9.

⁶⁹ Colleen Morris, “The Diffusion of Useful Knowledge: John Claudius Loudon and His Influence in the Australian Colonies,” *Garden History* 32:1 (2004), 101–23.

⁷⁰ J. C. Loudon, ed. and rev. William Robinson, *The Horticulturalist* (London: Frederick Warne and Co., 1871).

⁷¹ J. C. Loudon, *The Suburban Horticulturalist* (London: William Smith, 1842), 109–10.

⁷² Haldane, *All About Grub*, 24.

⁷³ *Ibid.*, 23.

⁷⁴ Clark A. Elliott, *Thaddeus William Harris (1795–1856): Nature, Science, and Society in the Life of an American Naturalist* (Bethlehem, Pa.: Lehigh University Press, 2008), 101–2.

He described the life cycle of the European common cockchafer and listed the birds and animals that were said to prey upon it, including badgers, weasels, martens, bats, rats, and the common crow.⁷⁵ Harris described the injuries inflicted on agriculture by the American rose chafer (*Macrodactylus subspinosus*), whose larvae, like those of the Ceylonese cockchafers, “begin to feed on such tender roots as are within their reach.” Fighting an infestation of the insects was difficult. Based on his own experiments and accounts from other landowners, Harris recommended brushing or shaking them from crops or covering plants with cotton fabric, though he was silent on who would carry out this task on the plantation. He also suggested farmers keep domestic fowl, or protect the wild birds, insects, and other animals which ate rose chafers.⁷⁶

Inspired, Haldane included a list of what he called “our natural allies” in his catalogue of possible remedies for the cockchafer beetle. This had long been a standard part of European agricultural discourse, where a form of “proto-ecology” recognised that removing some species could cause more harmful ones to flourish.⁷⁷ Haldane’s list described all known animals which preyed upon the beetle and its grubs, including wild pigs, birds, bats, spiders, and lizards. He was most complimentary of jungle pigs, which he had seen “grub a field of coffee most thoroughly.”⁷⁸ In addition to allowing pigs to do their work, “the few birds about coffee estates should be encouraged.” During his natural history excursions in Dimbula, Haldane also found a carnivorous beetle which stalked cockchafer grubs, attacking them with its mandibles. This glossy black beetle was, in the eyes of Haldane, one of the “best allies” available to planters, who should protect it.⁷⁹ On a more ambitious note, Haldane expressed hope that an infectious fungus which attacked cockchafers might one day be introduced and cultivated in Ceylon. Such a scheme was some way off. Fungal control of cockchafers was investigated during the 1890s, with French zoologist Alfred Giard experimenting with a member of the *Isaria* genus.⁸⁰ Haldane conceded that the habitat of his “natural allies,” the forests of Ceylon, had been felled to make way for coffee. “I fear all the aid we receive from our allies is but slight,” he concluded. “They may be willing, but their numbers are too few.”⁸¹

If swarms of cockchafer beetles could not be rolled back through natural means, noxious chemicals could prove an effective weapon. Some of Haldane’s earliest gestures in this direction were extremely crude. To stop the flight of cockchafers across Ceylon, Haldane directed Indian labourers to start a series of fires along a road. He hoped the smoke might force the beetles to turn back, though the results were inconclusive. “Sometimes,” he wrote, “the beetles do not seem to mind the smoke in the least.” By the time *All About Grub* went to press in 1881, Haldane was conducting far more sophisticated chemical experiments with commercially available products. He began by applying “Calvert’s 15% Carbohc Powder” and lime to the soil around coffee trees, but found that neither deterred cockchafers from laying their eggs.⁸² Haldane also conducted small-scale

⁷⁵ Thaddeus William Harris, *A Treatise on Some of the Insects Injurious to Vegetation* (New York: Orange Judd and Company, 1862), 27.

⁷⁶ *Ibid.*, 38–9.

⁷⁷ Jana Sprenger, “An Ocean of Locusts: The Perception and Control of Insect Pests in Prussian Brandenburg (1700–1850),” *Environment and History* 21:4 (2015), 513–36.

⁷⁸ Haldane, *All About Grub*, 16.

⁷⁹ *Ibid.*, 12–13. The practice of deploying biological controls in Europe and its colonies was not new.

⁸⁰ George Fleming, “Annual Report of 1895 of the Zoologist,” *Journal of the Royal Agricultural Society of England* 6 (1895), 722–64.

⁸¹ Haldane, *All About Grub*, 16. Haldane used the two-volume work *The Birds of India*, produced in the early 1860s by English ornithologist Thomas Caverhill Jerdon, to compile a list of “insect feeders,” which included swallows, woodpeckers, cuckoos, and pheasants.

⁸² Haldane, *All About Grub*, 13.

experiments with arsenic-based insecticides, using a product called “Purpuline” to kill fifty cockchafers in a box. He was, however, critical of its manufacturers for not providing further samples for him to test. He noted that the product was very similar to more readily available Paris Green, expensive, and too unreliable to “experiment with on a large scale.” Haldane used Paris Green on the roots of coffee trees, reporting that it appeared to kill or drive away grubs. “My own opinion,” he concluded, “is that it [Paris Green] is very uncertain, as to its results, never have been really tried to any extent.”⁸³

Another chemical remedy investigated by Haldane was “Calvert’s Carboic Acid Powder,” which he first tested by placing a sample in a small box containing grubs and fully grown cockchafers. After the substance did its work, Haldane moved onto field experiments, “putting a slight sprinkling of the powder under logs where there were quantities of grubs.” When he returned the following day, he found that the grubs had moved away, with the notable exception of those already buried in the soil. Haldane concluded that the powder could potentially prevent cockchafers from laying their eggs. His tinkering with various chemicals around coffee estates resulted in other planters sending him their own recipes. Alexander Stevenson, based in Colombo, supplied Haldane with “Poonac Ash” to experiment with. At the time of writing *All About Grub*, Haldane could only report that the coconut derivative made a good fertiliser. To encourage planters to fight against the insect and not abandon their estates, Haldane suggested that the bodies of cockchafers be used as a source of oil or fertiliser. In France, for example, cockchafers killed by immersion in boiling water were mixed with earth to form “a good manure.” Haldane, however, recognised that such schemes “are likely to prove expensive luxuries to those who are unfortunate enough to have to try them.”⁸⁴

Haldane’s approach to insect control was certainly broad and consisted of some innovative approaches, notably experimentation with different chemicals and the documentation of potentially useful animal and fungal species. Yet the fundamentals of his blueprint for cockchafer control in Ceylon ended up relying, as did the entire plantation system, on the availability of cheap and exploitable labour. The brutal British campaign against the Kandyan kingdom in the early nineteenth century left a local populace unwilling to work on the plantations. The British therefore turned to imported labour, plantation owners dispatching agents to recruit largely lower-caste workers from India. The march from coastal ports to the highlands was unforgiving, while conditions on the plantations themselves were equally appalling.⁸⁵ Despite the power of plantation owners and their agents over Indian labourers, forbidding them to leave plantations and meeting open resistance with harsh repression, workers adopted several strategies of resistance. Poorly paid labourers feigned sickness, slipped into the nearby jungle for rest, or abandoned sacks of coffee. They approached the courts to collect unpaid wages and occasionally went on strike.⁸⁶ Against this background, Haldane’s interest in biological or chemical solutions to insect pests can be seen in a new light. These “innovations” could serve to replace Indian labourers. Pesticides, after all, did not protest at unsanitary or inhumane working conditions.

Once grubs were spotted in the soil of a coffee plantation, intense levels of labour were required to remove them. On the authority of Scottish forester James Brown, Haldane suggested that planters carry out “deep draining” of their soil. His plan aimed to remove moisture from the soil, which would make it harder for beetles to lay their eggs and grubs to burrow. Haldane had already recognised that cockchafers stayed away from

⁸³ *Ibid.*, 15.

⁸⁴ *Ibid.*, 15–17.

⁸⁵ Hewa, “The Hookworm Epidemic on the Plantations in Colonial Sri Lanka,” 74–6.

⁸⁶ Duncan, *In the Shadows of the Tropics*, 89–92.

drier and lighter soils, which he reported the indentured Indian labourers in Ceylon called “white earth.” Haldane considered prevention better than cure. He related how a planter from Maskeliya had suggested diverting the beetles away from coffee by tying the leaves of jungle trees to sticks. Haldane ordered his labourers to shake the beetles which rested upon these leaves into sacks, for which they were paid four cents per hundred beetles (when Haldane was feeling at his most generous).⁸⁷ He also described issuing labourers with wooden pegs and coconut shells to “dig out the grub,” which he claimed was the only sure-fire cure for an infestation. The cure was a lengthy process, taking up to six months. Pruning and manuring coffee trees could help them survive grub attacks.⁸⁸ Realistically, this intense method of removing grubs by hand was only possible thanks to an influx of plantation labourers to Ceylon, largely from South India. In 1874, French entomologist Adolphe Boucard suggested that local authorities pay a bounty for every cockchafer brought to them.⁸⁹ Haldane did not have the same problem of encouraging the collection of cockchafers, thanks to the coerced labourers who maintained plantations.

Haldane ended up imitating traditional European techniques for the destruction of cockchafers; namely to remove and kill them by hand. By the end of the century, an increasingly professionalised body of economic entomologists in the British Empire had sought to distance themselves from amateur practitioners by highlighting their expertise in insect classification and the handling of toxic insecticides.⁹⁰ Haldane may have fallen short on the former, but he was no stranger to the latter. As Haldane soon discovered, it was more the cost and inaccessibility of insecticides than their toxicity which barred him from their use. A degree of government support was necessary to acquire insecticides in sufficient quantities to combat insect pests. In an 1880 letter to the *Ceylon Observer*, Haldane had suggested the “Home Government” might intervene to order the burning of land infested by cockchafers, citing the precedence of state intervention to battle rinderpest, or cattle plague, spread by the tsetse fly.⁹¹ The British government made no such move, suggesting that enlisting its aid in the purchase of insecticides would also have been a fruitless endeavour for Haldane. Ultimately, though, insect infestations by themselves did not materially alter the conditions on the plantations of Ceylon. They did, however, add extra impetus to shift cultivation from coffee to tea.

Conclusion

Haldane’s *All About Grub* was published in 1881 at a moment of existential crisis for European planters in Ceylon. Insect pests had not traditionally posed an existential threat to plantations on the island. “Though Ceylon possesses a large variety of insect life,” wrote the superintendent of the island’s Royal Botanical Gardens in 1914, “it has practically no insect-pest of an alarming nature as compared to some other countries.”⁹² During the late nineteenth century, however, many coffee plantations walked a fine line between profit and extinction. Their continued existence after the 1869 blight had relied on high international prices and cheap transport costs from government-built railways.⁹³ With prices now falling, even marginal expenses could spell disaster for growers. In Europe, the cockchafer beetle had long been more of a drain on agricultural resources than an

⁸⁷ Haldane, *All About Grub*, 12.

⁸⁸ *Ibid.*, 14.

⁸⁹ A. Boucard, *Handbook of Natural History* (London: Thomas Murray, 1874), 117.

⁹⁰ Clark, *Bugs and the Victorians*, 200.

⁹¹ Haldane, “Enemies of the Coffee Tree,” 6.

⁹² H. F. Macmillan, *A Handbook of Tropical Gardening and Planting* (Colombo: H. W. Cave & Co., 1914), 612.

⁹³ Wenzlhuemer, *From Coffee to Tea Cultivation in Ceylon*, 68–9.

imminent threat. Yet for Ceylonese estate owners faced with a precarious economic situation during the 1880s, beetles and their grubs became a more pressing problem. An examination of the insects and means to combat them had quickly become a topical issue. What was less clear was who was responsible for carrying out this work.

Into this gap stepped Haldane, recently rebuffed in an attempted intervention in the religious life of Ceylon, who argued that formal scientific training was not necessary to make a meaningful contribution to entomology. He joined a rising chorus of complaints from the planter community against government inaction. Despair at state inaction was expressed in the appendix to *All About Grub* by a fellow planter. The colonial authorities in Ceylon, they complained, were too slow to act on agricultural matters, as “ten years were wasted before it was thought necessary to investigate the cause of leaf-disease [blight].” They suggested the Dimbula Planters’ Association contact the British government for assistance and concluded that “it seems to be the best policy at present to leave everything essential to the prosperity of the island to private enterprise.”⁹⁴ In fact, planters on Ceylon had initially rejected the connection between fungal disease and a decline in coffee production, favouring a “physiological or environmental explanation” and experimenting with new methods of cultivation, fertilisers, and chemical sprays.⁹⁵ Haldane became part of this tradition, albeit using entomology to rise to prominence in plantation society. Science was bound up with his social standing, hence his visceral reaction to his public embarrassment at the Dimbula Planters’ Association and accusation of scientific sabotage.

Only a few years after Haldane’s entomological inquiries, the coffee industry on Ceylon began to collapse in earnest. The island’s colonial government urged planters to abandon coffee and begin growing tea, though not all were able to do so. At an 1883 meeting of the Planters’ Association, its chairman blamed a depression in the price of coffee for the collapse. He also, however, alluded to “abnormal seasons and pests,” the latter of which were “invisible enemies” to the planter and had “baffled all our efforts to counteract them.”⁹⁶ The beetles had triumphed, and Haldane had failed. His next book, the 1886 *Subtropical Cultivations and Climates*, urged settlers across the British Empire to expand their repertoire to include lesser-known crops. Drawing from his experience in Ceylon, Haldane suggested that coffee planters preserve “belts of jungle,” which could “protect the estate from vegetable diseases and the ravages of insects, which often do great damage to plantations.”⁹⁷ That same year, Haldane abandoned coffee cultivation and cofounded a tea company with fellow planter J. L. Loudoun-Shand. Haldane retired from the partnership in 1899 and settled in North Roe in the Shetlands.⁹⁸ The expansion of coffee plantations in Ceylon had brought a host of ecological problems, of which the cockchafer beetles were just one part. By examining efforts to combat them, we can see that Haldane deployed entomology as a tool of agricultural, economic, and social conservatism.⁹⁹ His story shows how entomology could be deployed as a tool of personal advancement, to protect his investments and earn the gratitude of his peers. Entomology could take place on the global

⁹⁴ Haldane, *All About Grub*, 32.

⁹⁵ McCook, *Coffee Is Not Forever*, 45–7.

⁹⁶ Duncan, *In the Shadows of the Tropics*, 176.

⁹⁷ R. C. Haldane, *Subtropical Cultivations and Climates: A Handy Book for Planters, Colonists, and Settlers* (Edinburgh: William Blackwood and Sons, 1886), 103.

⁹⁸ William H. Ukers, *All About Tea*, vol. 2 (New York: Tea and Coffee Trade Journal Company, 1935), 186.

⁹⁹ Ceylon’s planters were not “intellectually conservative,” as evidenced through their experimentation with various chemicals and methods of cultivation. They were, however, unwilling to accept the pessimism of scientific experts and refused to fundamentally alter or abandon the plantation system. See McCook, *Coffee Is Not Forever*, 44.

stage—complete with exported libraries of European texts and specimens dispatched to the British Museum—with the most parochial incentives behind its practice.¹⁰⁰

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¹⁰⁰ For a radically different approach to the construction of scientific “facts” through engagement with different communities in colonial Ceylon and beyond, see Bernhard C. Schär, “From Batticaloa via Basel to Berlin: Transimperial Science in Ceylon and Beyond around 1900,” *Journal of Imperial and Commonwealth History* 48:2 (2020), 230–62.

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