Author's Note:

First and foremost, thank you so very much for taking time out of your busy schedules to read this piece and offer me feedback. I understand that visitors to the seminar typically give a lecture, and so I appreciate the convenor's willingness to let me offer you a work-in-progress paper instead. I plan to turn this draft into an article for submission to a peer-reviewed. This piece is part (chapter 2, in fact) of a much bigger project examining the history of Kenyan coffee from its origins at the turn of the twentieth century up to the present day. As a chapter in the book, the piece explores how the colonial state – through its agricultural extension services – made coffee viable in the Central Highlands of Kenya and cultivated a trained cadre of technocrats and white, settler farmers to create a cash-crop industry out of thin air.

Meanwhile, the broader book has a couple aims. First, I am using the commodity of coffee to think about how Kenyans have experienced changes to capitalism over the past century, from the not-so-liberalism of British settler colonialism to the era of structural adjustment and neoliberalism of the late 1980 and onwards. Second, the book considers what Kenya's coffee industry can tell historians about the transition from British imperialism to US imperialism - how the shift altered Kenyan economic policy-making, political decision-making, and institutions.

Again, thank you so much for reading the paper below. I am thrilled to be visiting you at MIT, and I very much look forward to meeting you all and hearing what you have to say.

All the best,

Paul Ocobock

Planters' Progress
Coffee Science and Transimperial Circulations in Early Colonial Kenya

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Consider the misfortune of Major Charles MacGregor Taylor. In 1911, he found cutworms gnawing at the roots of his coffee trees. Taylor had only just settled in British East Africa, later known as Kenya, three years before. He had bought a piece of land that included thirty-five acres of mature coffee in Kabete, just north of the capital Nairobi. Unsure what to do about cutworms, Taylor called out Thomas "Bug" Anderson, the department of agriculture's entomologist whose laboratory was just down the road. Anderson, in his third year on the job, had no immediate solution. On the advice of his Gikuyu headman, Taylor turned to an unlikely ally: a local "witch-doctor." The man "arrived with an impressive equipment of gourds, scarified a sheep, declaimed his incantations and the Cutworms quickly departed."[1] The traditional knowledge of an African healer had bested a well-trained, western entomologist.

Tales of bewitched coffee trees and other such stories from Kenya's settler mythology stressed that they could only ever rely on their own resourcefulness. Meanwhile, experts like Anderson and other at department of agriculture bemoaned that settlers routinely ignored their recommendations. In spite of aspersions cast, together the state and settlers developed arabica coffee into a profitable cash crop in the first two decades of the twentieth century. Coffee became the colony's most profitable cash crop, the centerpiece of Britain's effort to nurture settler colonialism in Kenya. By 1924, the sale of coffee beans earned nearly £800,000, thirty-seven per cent of the colony's two-million pounds worth of exports. The figure rose to forty-one percent in 1928, decreasing only a decade later to twenty-five per cent with the ascendance of tea and other cash crops like pyrethrum.[2] By the end of the 1930s, nearly a thousand coffee farms in Kenya yielded as many beans per acre as Brazil, the largest coffee producer in the world.[3] The success of Kenyan coffee, and the planters who grew it, became an urgent necessity for the financial health of the colony.

In this paper, I tell the story of the earliest years of the department of agriculture and its coffee services in Kenya from the turn of the century until the end of the 1930s. The department of agriculture developed robust local institutions for agricultural research and infrastructure to share the scientific knowledge that became essential to the survival of the settler economy. From their research headquarters in Kabete and through their extension services, the coffee service transformed

[1] Mervyn F. Hill, *Planters' Progress: The Story of Coffee in Kenya* (Nairobi: Coffee Board of Kenya, 1958), 26. Taylor would later become the first chairman of the Coffee Marketing Board of Kenya. Another settler, C.K. Archer, who would go on to be the chairman of the Coffee Planter's Union, also frequented local African healers to deal with cutworm and mealybug.
[2] TNA:PRO CO 544/17, *Department of Agriculture Annual Report* (DAAR) 1924; CO 544/25, DAAR 1928; and Colony and Protectorate of Kenya (CPK), DAAR 1938.
[3] Chan Do Jung, "Institutions for the Production and Marketing of African Coffee Growing in Central Kenya, 1930s to 1960s, DPhil diss., (University of Cambridge, 2010), 44; and Paul Mosley, *The Settler Economies: Studies in the Economic History of Kenya and South Rhodesia, 1900-1963* (Cambridge: Cambridge University Press, 1983), 174.

settlers' estates into laboratories, producing ideas and techniques that laid the groundwork for the agricultural development that came to dominated the post-WWII period.[4]

As impressive as these early efforts were, the entwined successes of agricultural research and Kenyan coffee were just as dependent on staff and settler access to and circulation within wider, trans-imperial scientific networks. Solutions to coffee pests or better pruning techniques were not simply "discovered" on a local estate by an experiment-minded African laborer or in reference books on the shelves at Kew Botanical Gardens in London. In this paper, I also track remarkable moments when Kenya's colonial staff, their ideas, and their research crisscrossed through different, distant colonial and imperial spaces during the interwar years. And yet they were bound to geographies of arabica coffee and empire, limited in travel to spaces with similar, specific climatic conditions and systems of colonial exploitation.

Much of the scholarship on the settler economy in Kenya has focused on the political support and economic subsidies the colonial state granted to its small community of European planters. As elsewhere in the British Empire, the colonial state tried to create or pry open new markets and protect settler commodities from ever-shifting global prices.[5] Yet making settler economies profitable was no easy feat. If left to their own devices, European settlers in Kenya were, as the questionable, conventional wisdom goes, too "weak and incompetent" to make the colony profitable.[6] Most settler farms were run by smallholders with few means and many debts - an inexperienced petite bourgeoise thrashing to stay financially afloat.[7] The colonial state routinely came to settlers' aid. Local officials surveyed the region, demarcated it for settlement, alienated the African communities who lived and worked there, and offered financial support to get settlers started.[8] They violently compelled Africans to work on settler farms through labor laws, taxation, and strict policing of African movement and work-time discipline.[9] Although ever-anxious of scandal in the

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[4] Here I follow the lead of William Beinart, Karen Brown, and Daniel Gilfoyle who have argue that the historiography has tended to focus more on the political nature of scientific work rather than the activities of scientists: how they worked, with whom they worked, and where they worked. William Beinart, Karen Brown, and Daniel Gilfoyle, "Experts and Expertise in Colonial Africa Reconsidered: Science and the Interpretation of Knowledge," *African Affairs* 108.432 (2009), 425.

[5] Peter J. Cain and Anthony G. Hopkins, *British Imperialism: 1688-2000* (London: Routledge, 2001), 205-42. See also, Bernard Attard and Andrew Dilley "Finance, Empire and the British World," *The Journal of Imperial and Commonwealth History* 41.1 (2013): 1-10; Caroline Elkins and Susan Pedersen, "Introduction: Settler Colonialism: A Concept and Its Uses," in *Settler Colonialism in the Twentieth Century: Projects, Practices, and Legacies*, eds. Caroline Elkins and Susan Pedersen (London: Routledge, 2005), 5-6, 8-11; Ann Laura Stoler, *Capitalism and Confrontation in Sumatra's Plantation Belt, 1870-1979* (Ann Arbor: University of Michigan Press, 1985), 14-46; and Philip McMichael, *Settlers and the Agrarian Question: Capitalism in Colonial Australia* (Cambridge: Cambridge University Press, 2003) – just to name a few.

[6] E.A. Brett, *Colonialism and Underdevelopment in East Africa: The Politics of Economics Change, 1919-1939*. New York: Nok Publishers, 1973), 212.

[7] Jung, 47-8; and Bruce Berman and John Lonsdale, "Coping with Contradictions," *Journal of African History*, 501. See also, Claud R. Watson, "Notes on Coffee Industry in B.E.A. year 1909-1910," Kikuyu District AR 1909/10.

[8] Bruce Berman, *Control and Crisis in Colonial Kenya: The Dialectic of Domination* (Athens: Ohio University Press, 1990), 56; and M.P.K. Sorrenson, *Origins of European Settlement in Kenya* (Nairobi: Oxford University Press, 1968), 55-6, 69-70.

[9] Opolot Okia, *Communal Labor in Colonial Kenya: The Legitimization of Coercion, 1912-1930* (New York: Palgrave Macmillan, 2012), 93-113; Anthony Clayton and Donald C. Savage, *Government and Labour in Kenya, 1895-1963* (London: Frank Cass, 1974), 20-30, 91-101, 128-139; David M. Anderson, "Master and Servant in Colonial Kenya, 1895-1939," *Journal of African History* 41.2 (2000): 469-485. Histories of other settler colonies in British Africa, yield similar stories. For Malawi, see Tony Woods, "'Why Not Persuade Them to Grow Tobacco:' Planters, Tenants, and the Political Economy of Central Malawi, 1920-1940," *African Economic History* 21 (1993), 131-2; and Robin Palmer, "White Farmers in Malawi:

press, administrators routinely turned a blind eye to the violence settlers perpetrated against their African laborers, only occasionally checking their excesses.[10]

Yet these strategies were part of the story of nurturing a settler economy. Just as important: studying the environmental conditions of the colony, determining the best practices to efficiently exploit its resources, and communicating that knowledge to settlers. Settler colonialism in Kenya coincided with the rapid development of and "growing confidence in the use of science and expertise" fused with "new bureaucratic capabilities of the state, to develop the natural and human resources of empire."[11] By the interwar years, agricultural, veterinary, forestry and ecological sciences – among others – had become essential to the economic, political, and even moral development of Britain and its imperial territories.[12]

Kenya's early coffee service consisted of several scientists and administrators: a senior coffee officer who oversaw coffee production as well as a senior entomologist, mycologist, agricultural chemist, and growing number of assistants. Between laboratory and plantation, these men spent their days inspecting farms, testing new agricultural techniques, concocting insecticide recipes, and examining pests and fungi sent in by concerned farmers. In these endeavors, the coffee service did not simply apply "imperial" scientific knowledge to coffee production in Kenya.[13] Instead they produced locally-derived scientific knowledge that drew from their own expertise as well as the fieldwork they conducted in constant conversation with European settlers and estate managers, Christian missionaries, as well as African farmers and wage laborers.[14] They tried to transform a motley crew of émigrés, whether wealthy, speculating land barons or WWI veterans, into a professional planter class equipped with the necessary techniques for coffee-growing. These experts were also deeply invested in racialized, imperial pursuits. They used Africa as a testing ground for

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Before and After the Depression," *African Affairs* 84.335 (1985), 213-4. For Zimbabwe, see Ian R. Phimister, *Economic and Social History of Zimbabwe, 1890-1948: Capital Accumulation and Class Struggle* (London: Longman, 1988); David Johnson "Settler Farmers and Coerced African Labour in Southern Rhodesia, 1936–46," *Journal of African History* 33.1 (1992): 111-28; and Rupert, *A Most Promising Weed: A History of Tobacco Farming and Labor in Colonial Zimbabwe, 1890–1945* (Athens: Ohio University Press, 1998). Recent scholarship has shown that state interventions mattered less in Nyasaland than global market prices and African migration patterns. See Jutta Bolt and Erik Green, "Was the Wage Burden too Heavy? Settler Farming, Profitability, and Wage Shares of Settler Agriculture in Nyasaland, *c.* 1900–60," *Journal of African History* 56.2 (2015): 217-38.

[10] Brett L. Shadle, "Settlers, Africans, and Inter-Personal Violence in Kenya, ca. 1900-1920s," *International Journal of African Historical Studies* 45.1 (2012): 57-80; and David M. Anderson, "Punishment, Race, and 'The Raw Native': Settler Society and Kenya's Flogging Scandals, 1895-1930," *Journal of Southern African Studies* 37.3 (2011), 479-97.

[11] Joseph M. Hodge, *Triumph of the Expert: Agrarian Doctrines of Development and the Legacies of British Colonialism* (Athens: Ohio University Press, 2007), 8.

[12] Helen Tilley, *Africa as a Living Laboratory: Empire, Development, and the Problem of Scientific-Knowledge, 1870-1950* (Chicago: University of Chicago Press, 2011), 2-4.

[13] Early histories of science conceptualized scientific knowledge production in colonies as part of a unidirectional relationship between imperial metropole and colonized territory. George Basalla, "The Spread of Western Science." *Science* 156.3775 (May 5, 1967): 611-22. Roy Macleod later offered an alternative of the "moving metropolis" in which scientific knowledge traveled back and forth between metropole and colony. Roy Macleod, "On Visiting the Moving Metropolis: Reflections on the Architecture of Imperial Science," *Historical Records of Australian Science* 5.3 (1982): 1-6. See also John M. Mackenzie, "Introduction," In *Imperialism and the Natural World*, edited by John M. Mackenzie (Manchester: Manchester University Press, 1990), 8.

[14] David N. Livingston, *Putting Science in its Place: Geographies of Scientific Knowledge* (Chicago: University of Chicago Press, 2003), 13; and David Chambers and Richard Gillespie, "Locality in the History of Science: Colonial Science, Transscience, and Indigenous Knowledge," *Osiris* 15 (2001), 232

the advancement of science and betterment of Britons' lives back home – striving for the perfect cup and another settler economy to enrich the Empire.[15] Of course, Kenya's coffee experts did not have all the answers, and they very often got things wrong. Their mistakes could ruin a coffee crop, cloud a settlers' trust, and do violence to the land, its flora, and fauna.[16]

When they reached the limits of their understanding, they strummed the sinews of empire in search of answers, turning to fellow experts back in Great Britain at Kew Botanical Gardens or the Imperial Institute. These scientists were not simply bound to their own colonial or imperial networks. They "often saw their work through eyes trained in a global, comparative frame," and so their research and knowledge were highly mobile, circulating within, between, and outside nations and empires.[17] In Kenya, the coffee services staff circumnavigated the globe, circulating within the emerging scientific networks of the British Empire but also well beyond its boundaries. These circulations, while freeing in some respects, still suffered from blockages. Items lost in transit. Ideas lost in translation or to a lack of imagination. More importantly, seeking scientific knowledge outside one empire, often meant gaining it from another, and with it came another set of unequal relationships of power.[18] The staff of the department of agriculture learned a great deal from coffee planters in Central America, benefitting from their long histories of scientific exploration and exploitation as well as experts in the United States who were engaged in their own imperial pursuits in California and the Philippines.[19] The flow of scientific travel and ideas was also shaped by nature itself. The peculiar kind of arabica coffee, along with its pests and diseases, that flourished in the very specific environment of the Central Highlands of Kenya pushed scientists to seek information in analogous colonial places around the globe.

In the pages that follow, I explore the origins of coffee and European settlement in Kenya, focusing on the coffee services of the department of agriculture. I trace the gradual expansion of the

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[15] Tilley, 10-13. See also David Arnold, *The New Cambridge History of India, Volume 3, Part 5: Science, Technology and Medicine in Colonial India* (Cambridge: Cambridge University Press, 2000); and Richard Drayton, *Nature's Government: Science, Imperial Britain, and the Improvement of the World* (New Haven: Yale University Press, 2000). See also Alan Lester, "Imperial Circuits and Networks: Geographies of the British Empire," *History Compass* 4.1 (2006), 131-2; and Monica M. van Beusekom, *Negotiating Development: African Farmers and Colonial Experts at the Office du Niger, 1920-1960* (Portsmouth, NH: Heinemann, 2002), xxiv.

[16] John McCracken, "Experts and Expertise in Colonial Malawi," *African Affairs* 81.322 (1982), 101-16.

[17] Tilley, 7-8, 10; and William Beinart and Saul Dubow. *The Scientific Imagination in South Africa: 1700 to the Present* (Cambridge: Cambridge University Press, 2021), 4 and 22-4. See also David Wade-Chambers and Richard Gillespie, "Locality in the History of Colonial Science," *Osiris* 15 (2000), 221-40; Kostas Gavroglu and Manolis Patiniotis, "Science and Technology in the European Periphery: Some Historiographical Reflections," *History of Science* xlvi (2008), 162; and David Anderson, "Depression, Dust Bowl, Demography, and Drought: The Colonial State and Soil Conservation in East Africa during the 1930s," *African Affairs* 83.332 (1984), 342-3. German colonial officials relied on the expertise of African-American students of the Tuskegee Institute to train African cotton growers in Togo, and planters in Nyasaland depended on the assistance of foreign experts. Sven Beckert, *Empire of Cotton: A Global History* (New York: Vintage Books), 363-75; and Andrew Zimmerman, *Alabama in Africa: Booker T. Washington, the German Empire, and the Globalization of the New South* (Princeton: Princeton University Press, 2010), 139-62.

[18] Beinart and Dubow, 224; and Kapil Raj, "Beyond Postcolonialism…and Postpositivism: Circulation and the Global History of Science," *Isis* 104 (2013): 337-47.

[19] Joseph M. Hodge, "Science and Empire: An Overview of the Historical Scholarship," in *Science and Empire: Knowledge and Networks of Science Across the British Empire, 1800-1970*, edited by Brett M. Bennett and Joseph M. Hodge (Basingstoke: Palgrave MacMillan, 2011); Camille A. Suarez, "How California Was Won: Race, Citizenship, and the Colonial Rots of California, 1846-1879," (Ph.D. Dissertation, University of Pennsylvania, 2019); and Ian Tyrell, *True Gardens of the Gods: Californian-Australian Environmental Reform, 1860-19* (Berkeley: University of California Press, 1999).

state's efforts to study coffee, test new techniques to improve production, and protect the fledgling industry from pests, drought, and disease. Throughout, I show how the accumulation of scientific knowledge and practice depended on colonial officials' collaboration with local actors, European and African, as well as their access to a network of scholars, laboratories, and field sites around the globe. These first four decades of colonial rule in Kenya gave rise to a professionalized team of scientists and planters with deep institutional memory and expertise, ensuring that Kenyan coffee did not simply thrive but became one of the most coveted beans in the world.

Laying Down Roots

Arabica coffee traveled to East Africa in the pockets of Catholic missionaries evangelizing in the Indian Ocean World. While convalescing in Réunion in 1877, Father Antoine Horner of the Spiritans (or Holy Ghost Fathers) was introduced to the bourbon variety of arabica coffee. Bourbon had found its way to Réunion, then known as Bourbon Island, from Mocha, Yemen in 1718 and then flourished on the island.[20] Throughout the nineteenth century, bourbon beans traveled extensively around the globe. Brazilian planters began working with bourbon coffee in the 1860s, and several years later, so too did farmers in Central America.

When Father Horner returned to his work at Bagamoyo station, along the coast of modern-day Tanzania, he brought bourbon coffee seeds with him. The coffee failed at Bagamoyo. Although Bourbon coffee trees produce an incredibly mild, high-quality cup of coffee, they are extremely susceptible to pests like coffee borer and diseases like leaf rust.[21] Undeterred, the Spiritans took the seeds up and down the coast of East Africa. At St. Austin's mission station in Nairobi, the Spiritans discovered that bourbon thrived in the altitude, temperature, and rainfall of the Central Highlands despite the pests and disease. "We do not apply creosote," the Spiritans would say, "but say prayers 'contra locustas et alia nociva.'"[22] Prayers were answered. By 1904, St. Austin's was home to 1,000 bearing trees with a further 4,000 nearly ready to bear, arabica coffee typically takes three to five years to mature. A decade later, the number of trees had risen to 52,000. Bourbon coffee, which would become known as Kenyan coffee, was an imperial import brought by European imperial agents keen to finance their civilizing mission - as it was throughout much of the world.[23]

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[20] J.A. Kieran, "The Origins of Commercial Arabica Coffee Production in East Africa," *African Historical Studies* 2.1 (1969), 54-5; and Roland Oliver, *The Missionary Factor in East Africa* (London: Longmans, 1966), 177. Around the same time another arabica coffee plant was housed in the Royal Botanical Gardens in Paris, a gift from the Botanical Gardens in Amsterdam. Cuttings from this plant were taken to Haiti to establish the colony's first coffee plantations. Frédéric Mauro, *Histoire du Café* (Paris: Desjonquères, 1991), 25 and 39; and Julia Landweber, "This Marvelous Bean": Adopting Coffee into Old Regime French Culture and Diet," *French Historical Studies* 38.2 (2015), 213-4.

[21] World Coffee Research, "Bourbon," https://varieties.worldcoffeeresearch.org/varieties/bourbon, accessed 24 July 2022.

[22] Josephine O'Hare, "Coffee and the Holy Ghost Fathers," *Kenya Past and Present* 18.1 (1986): 13-6. See also A.D. le Poer Trench, *The Coffee Industry of Kenya Colony* (Nairobi: Government Press, 1926), 1; and W.J. Dawson, "The Importance of Plant Introduction with Special Reference to the Highlands," *The Agricultural Journal of British East Africa* 4.2 (1912): 143-4.

[23] Coffee was indigenous to East Africa and enjoyed by East Africans long before the arrival of these newcomers. In the late nineteenth century, Baganda farmers grew and used robusta coffee, most notably as a symbol of hospitality for visitors. While robusta coffee would ultimately find an important place in the agricultural production and profit of Uganda, arabica coffee was to be a white man's crop in Kenya. W. Senteza Kajubi, "Coffee and Prosperity in Buganda: Some Aspects of Economic and Social Change," *Uganda Journal* 29.2 (1965), 138.

As coffee grew at St. Austin's, so too did the aspirations of Great Britain in East Africa. In 1895, the British government bailed out the failing Imperial British East Africa Company, and assumed administrative responsibility for the territory between the coasts of the Indian Ocean to the east and Lake Victoria to the west. By the time the Spiritans harvested their first coffee berries in 1901, Governor Charles Eliot had decided that the British East Africa Protectorate could sustain a European settler population. Large swaths of the country were incredibly fertile, especially areas in the Central Highlands and up along the Rift Valley north of Nairobi, stretching westward to the coast of Lake Victoria. Long before the arrival of Europeans, agricultural and pastoral communities like the Gikuyu, Kipsigis, Luo, and Maasai had put that fecund soil to good use. As they thrived, they migrated out into the frontier, founding new families, farms, and herds. Rather than rely on the agricultural experience of these local communities, Eliot turned to European settlement; and from the very beginning, he saw coffee as a cash crop key to settler success.[24]

The railway, winding its way from Mombasa to Nairobi, built off the backs of thousands of African and imported Indian laborers, brought a slow, steady stream of settlers, mostly Britons and white South Africans, eager to find their fortunes in the soil. In the earliest years of the protectorate, many emigres were poor, white South Africans escaping the aftermath of the Anglo-Afrikaner War. From 1910 onward, most settlers were British exiles of a sort: titled elites, aristocratic sportsmen, absentee landlords, the younger sons and sons-in-law of well-to-do families, the black sheep of those same families, WWI veterans, as well as the down-and-out looking for a new start. These men set out to define themselves in stark contrast to the Africans on whose labor they so desperately relied. Early settler society was virulently racist, freely wielding physical and psychological violence to assert its prestige, discipline African labor, and guard against the perils of black sexuality.[25]

To settle these men and their families, the colonial government alienated thousands of acres of land from African communities and then sold it, often on freehold titles or leases of up to 999 years, to a handful of settlers.[26] Land in hand, settler survival then depended on their ability to attract African labor to their farms. Africans initially resisted leaving behind their herds and fieldwork to earn wages working for these newcomers. Yet again, the state intervened, pursuing several strategies to draw African labor out of the reserves: compulsory labor, taxation, evictions, movement restrictions – among many others.[27] Between 1903 and 1923, the number of Africans working outside their homes grew from 5,000 to 120,000. Whether in response to landlessness, state

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[24] Charles Eliot, Africa. No. 9, Report by His Majesty's Commissioner of the British East Africa Protectorate, 1901, 7-8 and Africa. No. 6, Report by His Majesty's Commissioner of the British East Africa Protectorate, 1903, 16-7 and 29.
[25] Brett L. Shadle, *The Souls of White Folk: White Settlers in Kenya, 1900s-1920s* (Manchester: Manchester University Press, 2015), 8-9; Dane Kennedy, *Islands of White: Settler Society and Culture in Kenya and Southern Rhodesia, 1890-1939* (Durham, Duke University Press, 1987), 42, 44-5; and C.J. Duder, "Men of the Officer Class: The Participants in the 1919 Soldier Settlement Scheme in Kenya," *African Affairs* 92.366 (1993): 69-87.
[26] John Overton, "The Origins of the Kikuyu Land Problem: Land Alienation and Land Use in Kiambu." *African Studies Review* 31.2 (1988): 109-26; and R.M.A. van Zwanenberg and Anne King, *An Economic History of Kenya and Uganda, 1800-1970* (Atlantic Highlands, NJ: Humanities Press, 1975), 37-8.
[27] Okia, 93-113; Clayton and Savage, 28, 38-9; Maria Fibaek and Erik Green, "Labour Control and the Establishment of Profitable Settler Agriculture in Colonial Kenya, c. 1920-45," *Economic History of Developing Regions* 34.1 (2019), 91-5. On taxation, see Leigh Gardner, *Taxing Colonial Africa: The Political Economy of British Imperialism* (Oxford: Oxford University Press, 2012). On squatting and migrant labor, see Tabitha Kanogo, *Squatters and the Roots of Mau Mau* (Athens: Ohio University Press, 1987), 12-6, 22-3; Frank Furedi, *The Mau Mau War in Perspective* (Athens: Ohio University Press, 1989); and Sharon Stitcher, *Migrant Labour in Kenya: Capital and African Response, 1895-1975* (Harlow: Longman, 1982), 35, 42.

coercion, or even choice, many Africans entered the wage labor market either as squatters or migrants, tending to settler's crops and livestock.[28]

For all the financial and logistical support, what mattered most to the government was whether these unseasoned settlers with vast tracts of land could produce profitable cash crops. Would-be coffee farmers required an education in agricultural science, technique, and production. Yet in the earliest years that knowledge did not come from the state and its nascent department of agriculture. Rather a settler's first port of call was St. Austin's where he could not only buy seeds and use the coffee processing machines the Spiritans had imported from France in 1906, but more importantly observe the expertise honed by the African converts who toiled in the coffee fields.[29]

Some of the first major settler coffee estates sprang up in Kiambu, an area alienated from the Gikuyu community that lay to the north and east of Nairobi, at the time a mere railway station rather than fledgling capital of the protectorate. Two of the first settlers to experiment with coffee were Jean Felix and Emile Favre. Felix, a Frenchman, and Favre, a South African, had come to Kenya in 1902 and combined their interests in farming coffee and importing wine, spirits, and other goods. By 1903, they had over hundred African laborers tending 160 acres of coffee on their 2,000-acre estate named St. Benoist (later known as Cheleta) in Ruaraka.[30] Felix and Favre became synonymous with coffee and wine in those early years, and like the Spiritans, they became a crucial resource for settlers looking to start coffee farms of their own.

By 1904, of the fifty-five settler farms spread across Kiambu, about fourteen, about a third, worked seriously with coffee.[31] That same year Henry Douglas Cooper arrived in the protectorate, backed by several silent financial partners. He took up 3,000 acres in Kabete, just to the east of Nairobi, which he named Kirawa Farm. He acquired his seeds from the mission and began working with a small 45 acres. When the coffee matured, he sold it in London for a good price, proving that coffee could be a viable, if not profitable, business.[32] For the next decade, the fertile ridges north of Nairobi - from Kabete to Kiambu to Ruiru - became the heart of settler coffee country, producing a high-quality mild coffee that piqued the interest of London brokers.

British traders had been searching for a new source of imperial coffee. In the late nineteenth century, Britain imported coffee from Ceylon and India. But in the 1880s, a fungus known as coffee leaf rust (*hemeleia vastatris*) obliterated Ceylon's coffee trees.[33] For years after, Britain purchased coffee from Brazil, the world's largest producer, as well as Costa Rica. Yet the British grew wary of America's dominance over the Latin American coffee market. When high quality coffee beans

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[28] TNA:PRO CO 544/1, East Africa Protectorate, *Annual Report 1908-9*, 30.

[29] Overton, "The Origins of the Kikuyu Land Problem," 113; and O'Hare, 13-6. Settlers and missionaries often became the first Europeans to study the climate, soil and suitability of crops along the imperial frontier. G.B. Masefield, *A History of the Colonial Agricultural Service* (Oxford: Clarendon Press, 1972), 11-4.

[30] Somerset Playne, *East Africa (British): Its History, People, Commerce, Industries, and Resources* (London: Foreign and Colonial Compiling and Publishing Co., 1908-9), 174. Their partnership dissolved in 1910, but Felix, who had always been the farmer of the two, continued to run the coffee estate.

[31] Elspeth Huxley and Arnold Curtis (eds.), *Pioneers' Scrapbook: Reminiscences of Kenya, 1890-1968* (London: Evans Brothers, 1980), 35-6.

[32] Playne, 179. As early as 1912, one coffee farmer earned an average of 81.5 shillings per cwt.

[33] Ceylon's plantation coffee industry never recovered, though peasant cultivation of coffee continued for years. See Roland Wenzlhuemer, *From Coffee to Tea Cultivation in Ceylon, 1800-1900: An Economic and Social History* (Leiden: Brill, 2008), 65.

arrived from British East Africa, the Colonial Office and British Board of Trade encouraged the colonial state to foster the burgeoning industry.[34] Coffee had but a small market in tea-drinking Britain. Much of the coffee that settlers produced in Kenya first traveled to London only to be exported to European countries like Germany.

As coffee trees matured in the Central Highlands, their first harvests earned reputations for high quality and fetched handsome profits in London. Excitement over rising prices meant that more and more settlers turned to coffee. By 1912, acting director of agriculture, F.R. Brandt boasted that, "so rapid has been its rise and so signal its success that it can now be classed as one of the major industries, and of first-rate importance."[35] Between 1903 and 1913, settler coffee grew from a mere 160 acres to over 5,000 acres. Its export value increased from 236 rupees in 1908 to 275,585 rupees just before WWI. As settlers rushed into coffee, they did so with little concern for the hard work and technical expertise they needed to succeed and survive on the colonial frontier.

The Early Science of Kenyan Coffee

Officials understood that most European settlers arrived in British East Africa with little knowledge of growing cash crops, let alone growing much of anything.[36] When M.D. le Poer Trench was hired to serve as the protectorate's senior coffee officer, after years working on coffee plantations in Jamaica, he arrived in East Africa skeptical of the settlers he met.

> To the coffee grower with little, if any, experience of planting, the essential factor to reap a golden harvest appears in his optimistic ideas is the planting of a certain acreage which he can claim to be "under coffee." Coffee is not, however, a crop that can be looked upon so lightly. The care and attention of the young plant from the nursery stage, the selection of suitable saplings for planting out, the pruning and training of the tree to the bearing stage, and the after treatment of the crop will materially affect the ultimate success, or otherwise, of the industry.[37]

There was much for Kenya's settlers to learn, and it was Trench's job, along with his colleagues at the department of agriculture, to set them on the right path.

Perhaps the most important intervention the department of agriculture made in settler economic life was its emphasis on teaching agricultural technique and science. Prior to WWI, three officials – an entomologist, mycologist, and a senior coffee officer – had a powerful impact inspecting farms, identifying diseases and pests, and testing solutions. They constantly shared their research with settlers, translating their data into practical advice. They also encouraged a culture of experimentation among the planters, creating a dialogue about the effectiveness or failures of various plans. Lastly, they inspected settler farms, even if only occasionally, to see how or if settlers were putting these ideas into practice. In this way, the state tried to make the science of coffee an essential part of everyday planter life.

For a time, coffee production was on such a small scale that the department of agriculture could keep pace with the number of settlers and their farms. Henry Powell, the chief of economic

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[34] Van Zwanenberg and King, 186-7.
[35] BEA, DAAR *1911-12*, 90.
[36] Berman, 133.
[37] BEA, DAAR *1913-14*, 123.

plants, inspected all the coffee plantations of the Central Highlands, reminding settlers to prune and remain vigilant for diseases. Some settlers arrived with so little expertise that Powell and the department focused on the basics. Those introductory lessons in coffee were passed along to settlers in a 1908 guide published in *The Agricultural Journal of British East Africa* and co-written by Powell, Felix, and Favre. It was a blend of practical how-to-guide, explaining even the most basic information, and promotional advertisement, encouraging new farmers to adopt coffee on their farms. Powell, Felix, and Favre guided planters step by step through the production process. They began with building and planting nurseries where seedlings would get their start. They then moved onto debates over how to prepare a coffee field (burn the preexisting brush or chop it down and use it for manure) and then how to space the trees (Powell had noticed planters in Ceylon planted trees 6x6 feet apart, but planters in East Africa preferred wider rows).

As trees grew, the guide stressed, settlers must prune. The authors could not overstate the importance of pruning the trees back and topping them off to promote fullness and easy harvesting. After three to five years, maturing trees would finally produce berries suitable for sale. Powell and the planters explained that after harvest, the berries must be pulped, separating the skin and pulp of the berry, and then placed in a cistern of water to ferment for a day or so. Fermentation removed the remaining matter around the bean, which could then be dried in sunlight and then exported.[38] These steps were commonly known as wet-processing, a more mechanized system of coffee production still used today. The authors did not advocate the older and less expensive method, known as dry or natural-processing common among farmers in Ethiopia. During dry-processing, farmers lay out the berries in the sun for several weeks, raking and turning them over until they are dry enough to export. Today, most farmers in Central Kenya continue to use wet-processing methods, which is preferred by buyers of finer, mild coffees.

Powell, Felix, and Favre also made note of the rising number of insects, pests, and diseases that threatened coffee production in the Central Highlands. Chief among them was *hemeleia vastatris*, the fungus that had wiped out the coffee plantations of Ceylon and devastated other colonial territories. Fears of leaf rust prompted the colonial government in Kenya to prohibit importation of coffee seeds from other countries as early as 1904 and then again in 1910.[39] They warned would-be planters that the government expected them to burn their trees if fungi like leaf rust were found on their farms. They also prepared a long list of remedies for protecting trees from ants, aphids, and other insects.

Did settlers eagerly read Powell's how-to guide? The report was available to anyone who requested it, but how widely it circulated is unknown. The department of agriculture and the planters themselves produced or commissioned numerous guides over the years.[40] Yet Powell, and later senior coffee officer Trench, did not simply rely on settlers to read their manuals. They brought the information in those guides directly to the settlers through inspections, demonstrations, and hundreds of written correspondences.

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[38] H. Powell, Economic Plant Division and Messrs Felix and Favre, "Coffee (Coffea Arabica Var.)," *The Agricultural Journal of British East Africa* 1.1 (Apr. 1908), 135-9.
[39] KNA AG/32/133, Entomologist to Dir. Ag., 3 Sept. 1910; Acting Dir Ag to Acting Chief Secretary, 20 July 1912.
[40] For the two most detailed guides see F.H. Sprott, *Practical Coffee Planting* (Nairobi: Caxton Printing and Publishing Co., Ltd., 1922); and F.H. Sprott, *Coffee Planting in Kenya* (Nairobi: East African Standard, 1927).

The most important investment in agricultural science was the establishment of Kabete Experimental Farm in 1908, later known as Scott Agricultural Laboratories. Under the management of James Johnstone, who had previously worked at West Scotland Agricultural College, Kabete Farm became home to a cohort of scientists whose work was crucial to the success of the settler economy. The farm housed the offices and laboratories of entomologist T.J. "Bug" Anderson, mycologist J. McDonald, and senior coffee officer Trench. The station also temporarily housed settlers as well as the managers they hired to oversee their estates, who stayed at Kabete Farm hostel to learn more about their future trade. Kabete Farm offered a series of lectures and demonstrations, including special sessions specifically on coffee. In 1920, the station was offering 60 lectures and 13 demonstrations, about 86 hours of instruction. The following year, about twelve per cent of the lectures at Kabete focused on coffee.[41] At Kabete, settlers and their managers met the coffee services staff with whom they would work – if of course they were successful – for years to come.

Kabete Farm was more than a classroom; it was a site of coffee experimentation. In 1911, 5,472 coffee trees were planted and another 8,564 were put to ground the year after. To tend the trees, the station hired a hundred or so African boys, mostly under the age of sixteen, from the juvenile reformatory next door. The inmates spent their days pruning trees, curing coffee, and spraying insecticide. When the trees began producing mature berries, the staff at Kabete began studying how to process coffee. In 1916, the farm housed two kinds of pulper as well as fermenting and washing tanks, allowing the staff to test pulping, fermenting, and drying techniques. Once the trees bore seeds, staff began selling coffee seeds to interested planters, making quite the profit for the station to the tune of thirty-seven per cent of its revenue in 1921.[42]

Out of Kabete Farm sprang numerous interventions and innovations in coffee production. One of the team's earliest successes was calming the settler community when two planters, E.G. Lushington and C.R. Watson, who co-owned Langdale farm in Kiambu, discovered *hemeleia vastatris* on their farm in 1912.[43] To be certain, the department sent samples to the chief mycologist in South Africa who confirmed it was indeed coffee leaf rust. He recommended burning the estate's entire crop to the ground.

The department immediately sounded the alarm, informing planters that leaf rust had been found in Kenya. They provided a description and photo of leaf rust and asked planters to inspect their trees and inform them, without delay, if they had found the fungus on their farms. Yet rather than hastily destroy Langdale Farm, MacDonald and Anderson conducted further research, traveling to German East Africa, where leaf rust has been present for years to get a sense of the damage it wrought. They found that leaf rust was nowhere near as devastating in German East Africa as it had been in Ceylon. Likewise, after corresponding with the mycologist at the Agricultural Institute in

[41] TNA:PRO CO 544/12, DAAR 1921 for the year ending Mar. 31st, 28 and 37; and CO 544/13 DAAR 1921 for the year ending Dec. 31st, 151.
[42] Paul Ocobock, *An Uncertain Age: The Politics of Manhood in Kenya* (Athens: Ohio University Press, 2017), 141-7, 162.
[43] KNA AG/2/38, AC MacDonald, Dir Ag, "To Coffee Planters and those interested in Coffee Planting in this Protectorate, 22 October 1912. Lushington and Watson had owned Langdale since 1906 and frequently struggled with disease and turned to the department of agriculture for advice. Playne, 239.

India, they learned that while a serious threat it had not done the same damage as it had in other parts of the Empire.[44]

When they returned from German East Africa, the coffee services team called a meeting of planters in Nairobi and asked them not to panic. It was possible, as in German East Africa, that leaf rust might not be so troublesome in their corner of the world. They shared the information they had gathered from German East Africa and India as well as word from the director of agriculture in Uganda that leaf rust was present there, too, but not a major threat. They assured the planters that they would first attempt to spray with fungicide before resorting to destroying entire plantations. Trench and McDonald, the mycologist, began immediately experimenting with the sprays recommended by the Agricultural Institute in India. They tried three different recipes and found that a bordeaux mixture used for grape vines was effective at eliminating the leaf rust. They then laid out specific instructions to settlers on how to replicate the mixture and apply it. In the end, no one had to watch their estates burn, and Trench no longer had any fear of leaf rust as long as settlers sprayed their trees and the department of agriculture kept up its efforts.[45]

The leaf rust scare pushed the department of agriculture to expand its surveillance of the industry despite its own financial limitations. At the urging of coffee planters themselves, the department began carrying out inspections of every coffee estate in the protectorate. The department raced to revise old rules, like the Diseases of Plants Prevention Ordinance, to grant them the power to inspect estates, order improvements, fine recalcitrant settlers, or destroy neglected farms. Planters were most worried by a growing number of small coffee farms that had been abandoned or mismanaged where disease and insects might spread undetected. Throughout 1912, several neglected coffee estates were burned with their owner's permission.[46] Of course, inspecting every farm for leaf rust also meant having a record of who was planting coffee in the protectorate, which the department did not. The department and the Attorney General began preparing rules, loosely based on those in Jamaica and Madras, that required anyone growing coffee to register their farm with their local district commissioner and anyone selling coffee to purchase a dealer's license.[47]

On the eve of WWI, coffee boomed. African laborers picked an estimated 275 tons of arabica coffee, a dramatic growth for a decade's old industry. Coffee and sisal, which was used to make agricultural cordage, were the protectorate's top two most valuable exports. And while WWI brought uncertainty, many coffee planters did not just survive the war, they prospered. While the market for coffee was disrupted, sales remained relatively stable. East Africa was an active theater during the war, and the British military bought local goods at market prices during its campaign

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[44] "Coffee Leaf Disease in British East Africa," *The Agricultural Journal of British East Africa* 4.4 (1912): 255-64; and BEA, DAAR 1913-14, 12.

[45] KNA AG/32/133, A.C. MacDonald, Dir Ag to Chief Secretary, 28 Jan. 1915; Hill, *Planters' Progress*, 32-3. In 1921, McDonald published a thorough, lengthy report on all the various fungoid diseases affecting coffee in Kenya, and more importantly provided instructions on how to treat them. J. McDonald, *Fungoid Diseases of Coffee in Kenya Colony* (Nairobi: The Uganda Railway Press, 1921).

[46] KNA AG/32/133, Regulations. Under the Diseases of Plants Prevention Ordinance, 1910. 1912; J.C. MacDonald, Director of Agriculture to Crown Advocate, 5 Jan. 1912; A.C. MacDonald, Dir Ag to Crown Advocate, 11 Jan. 1912; and Crown Advocate to Dir Ag, 24 Jan. 1912.

[47] Ibid., A.C. MacDonald, Dir Ag to Chief Secretary, "Registration of Coffee Plantations and Dealers," 10 Nov. 1916.

against the Germans. Coffee planters gained a small local market from military orders, they also lost considerable access foreign markets. Transportation was heavily restricted. The railway was used for military transport, and overseas shipping was threatened by German U-boats. The Board of Trade in London prohibited the shipping of coffee in 1917 to make room for more essential goods. Coffee planters used their growing political weight to push the Board of Trade to relent, guaranteeing shipping space for Kenyan coffee for the remainder of the war.[48]

The war pulled tens of thousands of men out of the protectorate's economy: estate owners, managers, government officials, and most importantly African laborers. Yet the loss of African labor, estate managers, or official oversight to military conscription did not irreparably damage coffee production. Settlers pressed the state to exempt African men working on coffee farms from military service and turned to hiring more women and children. Officials in the department of agriculture were not called away for any great length of time. Senior coffee officer Trench was in East Africa for most of the war, continuing his inspections. In fact, Trench was pleased that many farms were being well looked after by settler's wives, older neighbors, and African headmen. P.J.H. Coldham, who had arrived in Kiambu in 1910 and became one of the protectorate's most influential planters, relied on a Gikuyu headman to run his estates while he served in the war. Despite the uncertainties of the market, finances, and labor, coffee production increased, and planters added 3,500 acres of coffee to their estates each year of the war.[49]

Trench Goes to Central America

The armistice brought only brief respite to the British East Africa Protectorate, renamed Kenya in 1920. The colony suffered a severe drought, badly hampering production. The economic depression of 1920-21 forced the government to temporarily retrench several programs and departments. Acting director of agriculture Harrison noted that "much disappointment was felt by Settlers who had come into the country on the bubble of inflation. As the process of deflation progressed their assets depreciated and at the same time their prospects diminished."[50] Despite depression and drought, the settler population continued to grow after WWI as veterans arrived looking to remake themselves into planters. Over half of the six million acres of land alienated from Africans was now occupied by little more than a thousand European settlers, though, only 176,290 acres, or just under six per cent, were under cultivation. Settlers were growing more coffee than ever and earning higher profits. In 1923, the colony produced 139,060 cwts (6,953 imperial tons) of coffee at a value of £491,410 pounds (about £70 per imperial ton). The following year, the colony's climate and economy improved as did coffee production and prices in London and New York. At the end of 1924, planters sold 160,880 cwts (9,009 imperial tons) at a value of nearly £800,000 (about £89 per imperial ton), representing thirty-seven per cent of the total value of Kenya's exports.[51]

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[48] John Overton, "War and Economic Development: Settlers in Kenya, 1914-1918." *Journal of African History* 27.1 (1986): 82-3.
[49] Ibid., 86-90, and 94-5; and BEA, DARA 1915-16, 1.
[50] TNA:PRO CO 544/13, DAAR 1921, 8.
[51] For these figures, see TNA:PRO CO 544/13, DAAR 1921; TNA:PRO CO 544/16, DAAR 1923, 6-7; and TNA:PRO CO 544/17, DAAR 1924, 7-8.

Meanwhile, back at Kabete Experimental Farm, hope was in the air. Over the course of the mid-to-late 1920s, the colony experienced a period of increased development: railways and roads expanded, export-import businesses set up shop in Nairobi and Mombasa, and agricultural processing facilities were built for coffee, sisal, dairy, wheat, and livestock.[52] The director of agriculture argued that, "with better equipment on the Coffee Estates, and with the greater experience and skill which is being acquired in the handling and preparation of the crop for market, an improvement in the quality of the output is noticeable, and the demand for it is increasing."[53] Above all, the Kenyan coffee brand was now firmly established on the global market. Kenyan coffee had become a "high grade mild coffee" worthy of higher prices and competitive with Costa Rican coffee, an industry leader in high quality milds.

And it was Costa Rica to which the department of agriculture turned to improve coffee production in Kenya. The director sent A.D. le Poer Trench, the colony's new senior coffee officer and brother to M.D., on a tour of Central America to seek out innovations he could bring back to Kenya. In a short time, Trench had earned the respect of the settler community in part because he came from a long line of planters himself. Like his brother, A.D. Le Poer Trench was born and raised on a Jamaican sugar plantation and worked with Blue Mountain coffee in his youth. After studying at the Ontario Agricultural College in Canada, he managed the largest coffee estate in Costa Rica until being hired to fill his brother's post in British East Africa.[54]

Trench returned to Costa Rica and then traveled on to Guatemala to learn from some of the most technically proficient coffee growers in the world. Both counties made good sense given Trench's history with as well as bourbon coffee's success in the climate and altitude of both counties. Britain was also deeply invested in Costa Rica and Guatemala coffee industries. Over the course of the nineteenth century, Costa Rica and Guatemala had undergone a dramatic expansion in coffee production. The rise of coffee coincided with a series of liberal revolutions in Central America, in which elite families seized control of government, dispossessed indigenous communities, re-appropriated land from the Catholic Church, and encouraged European migration and investment. Coffee baron families entrenched their power as German settlers and English investors poured resources into the country. London-based merchants like William Le Lacheur and Son, who would be bought out by J.K. Gilliat and Company established direct trade between Central America and Britain. Between 1840 and the 1890s, Costa Rican coffee production increased from 20,000 cwts. (about 1,000 pounds) to nearly 400,000 cwts. (about 20,000 imperial tons). In 1883, fifty-seven per cent of Costa Rican coffee went to Britain. By 1910, the figure reached eighty-four per cent.[55] The coffee harvested by poor, poorly paid indigenous Costa Ricans and sold by well-to-do landowners became one of the gold standards for coffee on the global market.

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[52] Winston L. Cone, *The History of Kenyan Agriculture* (Nairobi: University Press of Africa, 1972), 53.
[53] Van Zwanenberg and King, 13.
[54] Coffee Board of Kenya, *Kenya Coffee* (May 1960), 163; and Hill, *Planters' Progress*, 46.
[55] Allen M. Young, *Chocolate Tree: A Natural History of Cocoa* (Washington D.C.: Smithsonian, 1994), 51; Jeffrey M. Paige, *Coffee and Power: Revolution and the Rise of Democracy in Central America* (Cambridge: Harvard University Press, 1997), 3-4, 13-1; and Robert G. Williams, *States and Social Revolution: Coffee and the Rise of National Governments in Central America* (Chapel Hill: University of North Carolina Press, 1994), 157. For more on nineteenth century coffee production, see Lowell Gudmundson, *Costa Rica Before Coffee: Society and Economy on the Eve of the Export Boom* (Baton Rouge: Louisiana State University Press, 1986).

Trench's trip yielded important information on techniques and lines of scientific inquiry that Kabete staff would take up for years to come. Trench learned a great deal about how planters maintained their trees. In fact, a large proportion of his report detailed pruning techniques. According to Trench, planters in Costa Rica used the capping system. When trees had recovered from being transplanted from the nursery to the field, the main stem would be capped, or cut off. Two new shoots would emerge on either side, and eventually, these would be capped as well. The result would be a coffee tree with four main stems from which all new berry-bearing branches would grow. The ultimate aim was to create a fuller tree that would produce more berries. Just as important, planters had to prune their trees back to prevent them becoming too unwieldy or too large to harvest. Trench learned that Costa Rican farmers did not approve of the double-stem method being used in Kenya. They argued that while it produced more berries, it required farmers to do too much pruning. As Trench knew, he and his predecessors had experienced incredible difficulty getting planters in Kenya to prune properly.[56]

In Guatemala, Trench observed another method known as "agobiada" or "bent over" in which the planter tied the top of the coffee plant down to the ground and then encouraged branches to emerge upward off the bent stem of the tree. "One of the strongest points in favor of this system," Trench noted, "is that it does not require intelligent labor to do this work, and it is simpler than the system carried out on single stem trees in Jamaica, India and East Africa, etc."[57] Agobiada fit in well with Trench's racialized view of agricultural labor - he had found a system that planters could understand themselves and then could teach African laborers. After returning to Kenya, Trench instructed planters, as well as the staff at Kabete to test the multi-stem and agobiada systems.[58] By the 1930s, these experiments confirmed that Costa Rican and Guatemalan farmers were right, multi-stem and agobiada methods produced far better yields and higher quality beans than the pruning techniques traditionally used in Kenya.

Shading and manuring were just as important as capping and pruning. During his trip, Trench found that planting shade trees among coffee trees, especially in drier, hot areas was essential to nurturing the trees and extending their lifespan. Farmers had found banana and *inga vera* trees provided excellent shade as well as manure. The leaves of the trees would fall in between the rows of coffee, decompose, and serve as a nitrogenous manure. Farmers also used cattle manure, lime, and green manure. Green manure required planters to grow secondary crops like legumes in between the rows of coffee trees, chop them down, and allow the cut plants to fertilize their trees. Once Trench returned to Kenya, he and the agricultural chemist spent considerable time encouraging farmers to experiment with different kinds of manure as well as shade trees, especially in Western Kenya.[59]

Drawing on his personal connections, Trench's trip to Central America brought the coffee services and Kenya's settlers into direct contact with coffee growers who had decades of expertise under their belts. Trench returned to Kenya armed with their knowledge, ready to test it and put it into practice in the Central Highlands. His trip came at an opportune time. After the recession and

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[56] A.D. Le Poer Trench, *Report on Visit to Guatemala and Costa Rica to Investigate Methods of Cultivation of Coffee, and its Diseases and Pests* (Nairobi: Government Printer, 1920), 5-6.
[57] Ibid., 8.
[58] TNA:PRO CO 544/15, DAAR 1922, 126-7.
[59] Trench, *Report on Visit to Guatemala and Costa Rica*, 12, 14-5; and TNA:PRO CO 544/15, DAAR 1922, 126-7.

retrenchment of 1920-1, the department of agriculture began growing again.[60] By the end of the 1920s, director of agriculture Alex Holm helmed an expanded administration. Trench now had four temporary assistants to inspect coffee farms. T.J. Anderson led three assistant entomologists. And both teams worked closely with mycologist J. McDonald as well as agricultural chemist V.A. Beckley, and his assistant. Moreover, the districts of Kenya now had agricultural officers who liaised between settlers, estate managers, and African farmers.

Local Experimentation and Exasperation

In 1922, this ever-expanding staff at Kabete Experimental Farm moved into a new, nearby facility: Scott Agricultural Laboratories. The laboratory, housed on the ten-acre site of an old sanatorium built in 1913, had been used as a hospital during the war. By 1936, the laboratory had grown to 73 acres, of which 24 were wholly devoted to coffee experimentation.[61] Much of the department's experimental work took place at Scott Laboratories. There the colonial state's agricultural experts and their African assistants tested the techniques Trench had learned abroad and sought solutions to settlers' growing list of troubles and queries.

The expansion of Kenya's department of agriculture - its staff, research, and extension work - was part of a much broader trend throughout the interwar period. What had begun in the late nineteenth century in British India, Ceylon, Jamaica, and Barbados, was replicated across the British Empire.[62] Most colonies had departments of agriculture by the 1920s, and the personnel offering technical services in British Africa rose from 600 in 1919 to nearly 2,000 in 1931. More and more, colonial agricultural experts met one another to share their ideas and results at imperial coordinating conferences.[63]

Like Kabete Farm before it, Scott Laboratories was a local site of research, training, and knowledge production, the center of an expanding web of extension services carried out on settler farms. Yet Scott Laboratories was also entangled in a much messier cobweb linking it to research carried out back in London at Kew Botanical Gardens and the Imperial Institute, other colonial research institutions like the Imperial Department of Agriculture in India, and across an array of transnational, trans-imperial networks.[64] These global connections were driven by the local initiative of men like Trench during his trip to Central America or drawn in by the arrival of the latest research publication or a letter of inquiry from a colleague in Uganda, Ceylon, or the Dutch East Indies.

Some of the most important research breakthroughs for coffee production during the 1920s were local solutions derived from laboratory work at Scott Laboratories or supervised experiments

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[60] Berman, 128-30.

[61] "The Scott Agricultural Laboratories, Nairobi." *The East African Agricultural Journal* 1.4 (1936): 297-301. The laboratory was named after the late Dr. Henry Scott, of the Church of Scotland Mission, Kikuyu.

[62] Masefield, 18-9, 29, 76.

[63] Tilley, 9, 126. During the interwar years, four conferences were held on forestry, four on entomology, three on mycology, two on surveying – just to name a few, 131. For the expansion of departments of agriculture in French West Africa, see van Beusekom, xxiv.

[64] Michael Worboys, "The Imperial Institute: The State and the Development of the Natural Resources of the Colonial Empire, 1887-1923," in *Imperialism and the Natural World*, edited by John M. Mackenzie (Manchester: Manchester University Press, 1990).

being run on planters' estates. Agricultural chemist, V.A. Beckley, juggled a great many projects working at Scott Laboratories from soil erosion, sisal waste waters, organic manures, and even essential oils. One of his most significant discoveries for coffee planters was a way to speed up the wet-processing of coffee berries without sacrificing quality. Farmers typically fermented their beans in cisterns of water for twenty-four or more hours.[65] While the beans soaked, the pulpy matter surrounding them dissolved away and they were ready for drying.

In 1926, Beckley began a series of experiments to see if fermentation could be sped up and made more uniform. That uniformity would be crucial to earning higher prices on the London market. Beckley prepared four batches of coffee for fermentation; one was left to ferment naturally while the others were introduced to different kinds of yeast. The yeasts were prepared by the Kenya Brewery, which had opened four years earlier and produced the lager known as Tusker. When Beckley returned to examine his batches, it was clear that those infused with yeast fermented six to eight hours faster. He surmised that natural fermentation was slower and less certain and that adding yeast created a faster, more controlled process - not unlike winemaking.[66]

Three years later, having determined that yeasts' growth during the process slowed down, Beckley began searching for other agents to speed up fermentation. He began testing the bacteria found naturally during the process. With help from the staff and equipment in the veterinary research laboratory, Beckley isolated the bacteria and inoculated fermenting coffee with it. Immediately the chemist and his staff noticed results, the bacteria sped up fermentation by an average of thirty-three per cent, and in some cases as much as fifty per cent. They also felt that the coffee produced a much cleaner, sweeter smell. They sent the beans to J.K. Gilliat and Company to determine the coffee's quality. The company reported back that the new process had indeed improved the taste. Tests in the field with planters also revealed that the faster fermentation time allowed farmers to more quickly produce beans for export. In 1929, Beckley prepared 2,000 test tubes of the inoculant to be given to farmers the next coffee season.[67]

The interwar years also brought renewed threats from and focus on the many local and regional pests that preyed on Kenyan coffee, such as long-horned beetles, thrips, coffee berry moths, and coffee berry borer. One of the most intense outbreaks came in 1928 when coffee berry borer (*Hypothenemus hampei*) was found on one of the oldest coffee farms in Kiambu. Coffee berry borer is one of the worst coffee pests in the world. It drills holes in the berry where it makes its home, mates, and lays its eggs, resulting in the total destruction of the coffee berry. Officials in Kenya were well aware of its existence. The borer had been identified in Uganda as early as 1908. At the time, T.J. Anderson had been concerned that it might travel from Uganda to Kenya inside contaminated bags of beans and pushed for early regulations that restricted the importation of coffee beans. For two decades, those policies seemed to keep the borer at bay.[68]

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[65] Powell, 138; and A.D. Le Poer Trench, *Report on Visit to Guatemala and Costa Rica*. V.A. Beckley was a prolific researcher, publishing dozens of papers on a range of issues between 1929 and the late 1940s.
[66] TNA:PRO CO 544/20, DAAR 1926, 121-2.
[67] CPK, DAAR 1929, 425-6.
[68] TNA:PRO CO 533/383/1 A.D. le Poer Trench, Senior Coffee Officer, "Report on the Stephanoderes Campaign, 1929," Aug. 1929. Officials in Kenya had known about berry borer since 1908. Today *Hypothenemus hampei* is found in nearly every coffee producing country and it is considered one of the major constraints to production that coffee producers face. See Fernando E. Vega et. al., "The Coffee Berry Borer, Hypothenemus Hampei (Ferrari) (Coleoptera:

When berry borer was found in Kiambu, "no time," Anderson wrote, was "lost in an attempt to devise ways and means for the control of this insect pest."[69] All the coffee trees on the Kiambu farm were cut down and burned. The entire plantation was cleaned up and its store fumigated. Rapid inspections of sixty-seven surrounding estates followed, revealing that seventeen were also infested. Government infused the department with £5,000 and senior coffee officer Trench was given sixteen temporary assistants to aid with inspections.

Over the course of the next two years, Trench and his team of assistants found forty-two "totally abandoned or neglected shambas." They ordered the coffee trees destroyed and the farms cleaned up. Most planters complied but in "a few cases it was necessary to bring a certain amount of pressure to bear before this menace was removed."[70] The campaign allowed the department to inspect every coffee farm in Central Kenya and create a new system for recording inspections, which they believed would help with future outbreaks. Drawing on the data from Trench and his inspectors, Anderson, the senior entomologist, and his assistants studied 250,000 coffee beans and tracked the spread of the berry borer on a large map of Central Kenya hung up in the department. Just over ten per cent of the beans Anderson examined were infested. This was welcome news. The rapid response and burning of infested plantations had quarantined the berry borer to Kiambu and Ruiru.

Anderson and his team also found berry borer favored *mbuni* coffee – overly ripe cherries picked at the end of the season.[71] Trench and Anderson argued that farmers left too many overripe *mbuni* berries on their trees and waited too long to harvest them. Part of the problem, settlers argued, were near-constant labor shortages; they simply did not have enough African laborers to strip the trees in time. Yet planters made money off *mbuni* coffee. For years they had sold off *mbuni* as triage coffee, the lowest of quality for which there was a steady market in countries like South Africa. Trench lamented that "a number of coffee planters [...] appear to be prepared to risk a serious loss to their main crop by taking no steps to combat a possible serious outbreak of *Hypothenemus hampei* rather than to have their trade in Mbuni in any way impaired."[72] The coffee service was far more agitated, it seemed, about the outbreak than coffee planters. Throughout 1929, Trench held eight meetings across the Central Highlands and in Western Kenya to discuss the outbreak. Only 188 farmers attended, less than a third of coffee farmers in those areas.[73]

It begged the question: could the coffee service rely on settlers to carry out their instructions? Were any of the 2,000 test tubes prepared by Beckley used to inoculate the wet-processing? Were settlers taking the berry borer outbreak seriously after the department cleaned out the infected estates? The answer: not with any certainty. Getting settlers onboard scientific work, or

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Curculionidae): A Short Review, with Recent Findings and Future Research Directions," *Terrestrial Arthropod Reviews* 2 (2009): 129–47.

[69] TNA:PRO CO 544/25, DAAR 1928, 174.

[70] TNA: PRO CO 533/383/1 A.D. le Poer Trench, Senior Coffee Officer, "Report on the Stephanoderes Campaign, 1929," Aug. 1929.

[71] Ibid., Thomas J. Anderson, "Control of Stephanoderes," 6 Aug. 1929; and Edward Grigg, Governor to Lord Passfield, SSC, 8 Oct. 1929.

[72] Ibid., A.D. le Poer Trench, Senior Coffee Officer, "Report on the Stephanoderes Campaign, 1929," Aug. 1929.

[73] TNA:PRO CO 544/25, DAAR 1928, 256. See also A.D. le Poer Trench and T.J. Anderson, *A Report on the Campaign Against Stephanoderes* (Nairobi: Government Printer, 1929).

at a much more basic level, carrying out recommended agricultural techniques had always proven difficult. And as the department of agriculture expanded its work, running more experiments on settler estates and checking in more frequently to ensure their instructions were followed - frustrations mounted.

Consider Trench's exasperation when he returned from leave only to find the experiments he had begun with several farmers abandoned. "During my absence from the Colony, some of the trials have been abandoned, besides which, some coffee planters who undertook to carry out cooperative experiments have abandoned them [...] the planter either loses interest of finds he must abandon the work as he does not know how to carry on without further advice [...]."[74] Without the nagging or hand-holding of the state, Trench complained, coffee advancements could not be made. Director Holm echoed Trench's frustration. There were, after all, Holm argued, a number of "highly intelligent landowners and farmers" able to appreciate the "value of science." But, "there are many others who apparently do not possess a 'bent' for farming. They are not likely to succeed in any circumstances, and it is feared that they will always lag."[75]

Just as C.M. Taylor had complained about T.J. Anderson's inability to dispense with his cutworms, so too, did the coffee services staff fret over thick-headed coffee planters. Trench and Holm's exasperation emerged from the increased intensity of the government's engagement with settlers in matters of agricultural science. The more the coffee services provided extension work, the more experiments run on estates, the more opportunities for settlers to let them down. As the process of scientific knowledge production moved between Scott Laboratories and settler estates, it absorbed planters, willing or not in this kind of work. Out of this fieldwork came narratives about the kinds of men growing coffee out there on the Central Highlands. Experts like Trench, Anderson, McDonald, and Holm were not impressed by what they saw: the archetypal lazy, privileged settlers distracted from hard work by leisure and sport.[76]

Anxiety of a class of planters dependent on state expertise and British taxpayers' subsidy worried officials back in London. When the government in Kenya requested more funds for more entomologists and research stations to combat the coffee berry borer, Colonial Office officials wondered aloud why coffee planters were not taking on more of the financial burden. Guy Marshall, the Director of the Imperial Institute in London argued that throughout the Empire, planters hired their own private entomologists.[77] Frank Stockdale, who had served as the Director of Agriculture in Ceylon and then spent much of the interwar years as Agricultural Advisor to the Secretary of the State for the Colonies, agreed with Marshall. Stockdale noted that the Empire teemed with various research schemes run in partnership between settlers and the state, such as the Tea Research Institute in Ceylon, Rubber Research Institute in Malaya, Coconut Committee in Fiji, and Sugar Planter's Scheme in British Guiana. He certainly saw no reason why the coffee planters of Kenya could not contribute more.

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[74] TNA:PRO CO 544/23, DAAR 1927, 250.
[75] TNA:PRO CO 544/25, DAAR 1928, 5.
[76] Livingstone, 47-8.
[77] TNA:PRO CO 533/377/2, Governor of Kenya to SSC LCMS Amery, 24 Jan. 1928; G.A.K. Marshall, Imperial Bureau of Entomology to G.F. Seel, Colonial Office, 13 Mar. 1928.

Yet Stockdale was firm that "research on individual crops financed by industries should, in my opinion, be, under Colonial conditions, subsidiary to the work which the Government Department of Agriculture or the Government research stations can perform. It should never be allowed to replace the [work of] Government."[78] Throughout the interwar years, there was general agreement that scientific research, like entomology and mycology, should remain the responsibility of the state, but that settlers should carry out and pay for the best practices that government researchers recommended.

Of course, coffee planters in Kenya objected. It was the state's responsibility, they argued, to provide scientific services until the industry had reached an appropriate stage of development, though they were careful not to define what that stage might look like. The colonial government, for its part, was quite willing to carry on in this way. After all, settlers had political sway, and the coffee industry kept the colony financially afloat. And within the corridors of the department of agriculture and Scott Laboratories, the very existence of a more robust coffee service was rooted in its ability to project a hapless planter class in need of constant government attention. But it could be unforgiving work. For all the extension services the department offered, it did not satisfy settlers' needs: not enough inspections of and fines for incompetent neighbors, not enough support reducing railway shipping rates or increasing low-interest loans, not enough time and research dealing with diseases and pests.

Science Between Empires

Of all the blights on Kenyan coffee, none caused settlers and the coffee service more consternation than mealybug. Much of the 1920s and 1930s was spent desperately seeking a solution to control a pest that threatened to obliterate the coffee estates of the Central Highlands – a solution that took the coffee services on a journey across the globe, between British, American, and other empires, and back again. Mealybugs are found all over the world. Small in size, they are identified by their scale-like appearance, the result of wax secreted to ward off predators. Mealybugs attack numerous plants such as citrus and coffee trees. In Kenya, mealybugs had been noticed on coffee estates just north of Nairobi in 1909. Studying the morphology of the bug, T.J. Anderson and his assistant entomologist T.W. Kirkpatrick identified it as *Pseudococcus lilacinus*, a species of mealybug commonly found circulating the Indian Ocean World, prevalent in the Philippines, Dutch East Indies, Ceylon, and southern India. Unbeknownst to Kenya's entomologists, they had misidentified the specimen, a mistake that would set back their effort to control the bug for several years.[79]

Over the course of a decade or more, the mealybug quietly spread to other farms, a relatively minor pest compared to other coffee producing countries. Then quite suddenly in 1923 planters in Ruiru and Thika found their farms overrun. That year the mealybug infestation destroyed nearly half of their crop. Year to year, the outbreak spread from farm to farm as did the devastation. Planters

[78] TNA: PRO CO 533/383/1, F.A. Stockdale to Alex Holm, Director of Agriculture, 31 Aug. 1929.
[79] T.W. Kirkpatrick, *The Common Coffee Mealybug in Kenya Colony* (Nairobi: Government Printer, 1927), 110; and Dennis S. Hill, *Agricultural Insect Pests in the Tropics and Their Control* (Cambridge: Cambridge University Press, 1975), 30-1. There were in fact six different types of mealybugs in Kenya, but the misidentified *Pseudococcus lilacinus* was the most common.

estimated their losses at 50 tons of coffee in 1927 (a loss of £4,778) and a further 200 tons in 1929, or three percent of the total crop that year (a loss of £19,212).[80]

In 1924, nearly all of Anderson and Kirkpatrick's entomological work focused on eradicating mealybug. They tried everything: sprays, dusts, even applying denatured alcohol by hand with tiny brushes. Anderson and his team noticed that ladybugs were eating the mealybugs, but they were far too few in number to make much difference. And so Anderson looked for a way to introduce more. His first port of call was to his colleague C.W. Mally, the senior entomologist in Cape Town, South Africa. Mally suggested that Anderson try a ladybug known as the mealybug destroyer, *Cryptolaemus montrazuieri*. Citrus farmers in South Africa had been struggling with a different mealybug, *Pseudococcus citri*, which entomologists believed had come by way of Australia. They had then sought out natural predators for *citri* in Australia and found mealybug destroyer. When released in large numbers, they had proven more successful in killing *citri* than pesticides.[81]

Mally sent Anderson a "small colony" of the ladybugs, which arrived at Scott Laboratories dead. Yet the team was able to rescue 144 larvae and bred them to maturity. When Anderson introduced the ladybugs on the infested estates, he watched as ants killed or chased them away. Ants accompanied the mealybugs, feeding off their secretions and defending them from potential predators. Anderson and his team then tried poisoning the ants only to observe the ants learn to avoid the poisons altogether. Spraying for mealybug also proved ineffective.[82]

A small breakthrough came in 1925, one that required a great deal of effort and precision on the part of planters. Anderson, working with V.A. Beckley, the agricultural chemist, recommended that planters band their coffee trees. Banding required each tree be wrapped in cotton wool, purchased from Uganda, and then wrapped in greaseproof paper and over that, a band. Creosote, a plant-derived tar, should then be spread over the band. The working theory in the entomology office was that ladybug larvae would pupate in the cotton and emerge to eat the mealybugs. Meanwhile the ants would be ensnared by the creosote. Anderson warned farmers not to allow the creosote to soak into the bark. However, when Anderson and Beckley traveled to Ruiru, they discovered that farmers were not following their instructions. In fact, some were using creosote as a repellent, soaking the trees and severely damaging them.[83]

For the remainder of the 1920s, when he was not tinkering with yeasts and fermentation, Beckley improved the banding method. Greaseproof paper which leaked creosote into the bark of the trees was replaced with cellophane. Anderson encouraged planters to band but also improve other techniques like manuring and pruning to help trees bounce back from mealybug attacks. And yet, despite the outbreak, Anderson still struggled to get farmers onboard. In 1929, his frustration was no longer with the inadequacy of his solutions but of the efforts made by planters. "It would

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[80] R.O. Abasa, "A Review of the Biological Control of Coffee Insect Pests in Kenya," *East African Agricultural and Forestry Journal* 40.3 (1973), 292.

[81] The story of *citri* and its spread as well as Anderson's turn to South Africa for answers was part of an older story of the development and importance of the field of entomology in South Africa, Australia, and the United States, which would, as we will see later, have a profound impact on Kenya's search for answers. Karen Brown, "Political Entomology: the Insectile Challenge to Agricultural Development in the Cape Colony, 1895-1910," *Journal of Southern African Studies*, 29.2 (2003), 531.

[82] TNA:PRO CO 544/17, DAAR 1924, 99-100; CO 544/18 and DAAR 1925, 138-140.

[83] TNA:PRO CO 544/20, DAAR 1926, 138-9 and CO 544/23, DAAR 1927, 250.

probably assist some planters to band more effectively against the attendant ants of mealy-bug if they obtained a firm grasp of the principles underlying the process."[84] For settlers, banding was costly and time consuming; a steady supply of African labor was already scarce, especially during the depression. The bands, creosote, and other materials needed replacing each year at a cost to the industry of £25,000. Only a handful of settlers were willing to put in the time and effort to keep up with banding, or use the proper technique.

Mealybug continued to plague planters in the Central Highlands throughout the depression, but then in 1935 another, more lasting breakthrough occurred. That year, the department of agriculture won a Commonwealth Fellowship, which allowed Richard Le Pelley, one of the department's entomologists, to travel to Washington D.C. to study Kenya's mealybug. While in Washington, Le Pelley worked alongside Dr. Harold Morrison, the senior entomologist at the Bureau of Entomology and Plant Quarantine at the U.S. Department of Agriculture.[85] Morrison was a world-renowned entomologist, known for his work with insects like mealybug. Le Pelley viewed conducting research in the United States as common sense. The United States was home to some of the most renowned entomology laboratories in the world. South African entomologists had long traveled to the United States and learned from their American counterparts.[86]

While working in Morrison's lab, Le Pelley began to suspect that the mealybug ravaging coffee estates in Kenya was not *Pseudococcus lilanicus* but an entirely new species. Morrison agreed with Le Pelley's assessment and encouraged his experiments. Yet Le Pelley faced skepticism from his superiors back in London. Guy Marshall, the director of the Imperial Institute for Entomology, firmly believed that Kenya's mealybug was an imperial import likely brought from southern India.[87] To Marshall, Kenya's local mealybug problem was the result of the flow of goods between India and East Africa. Its origins and therefore its solution would be found within the British Empire.

The disagreement between Le Pelley and Marshall mattered a great deal. Discovering the origins of Kenya's mealybug was essential to its control. Mealybug predators had very specific tastes, attacking only the local species they knew. For example, during an experiment a few years later, in which Le Pelley released a batch of 3,300 parasites sent from the Agricultural College at Laguna, Philippines onto coffee bushes in Kenya, the parasites refused to lay their eggs in these unfamiliar mealybugs.[88] If Marshall was correct, and Kenya's mealybug was originally from southern India, then Le Pelley would find its natural parasites there. But if Le Pelley was correct, and the mealybug was a new species, then a much wider net must be cast to find its original home and predators. Complicating matters further, Le Pelley was a young entomologist with only a few years under his belt. Marshall was one of the most senior entomologists in the British Empire with years of experience. If Le Pelley was right, then he was going to have to prove it with more than just support from American colleagues.

Convinced of his discovery, Le Pelley left Washington D.C. and made his way out west, touring various entomology labs along the way. His final and most important destination was the

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[84] CPK, DAAR 1929, 438.
[85] KNA BV/6/525, Richard H. Le Pelley, Red. Mealy Bug Work, 29 Oct. 1935.
[86] Brown, 534-5.
[87] Ibid., Guy M. Marshall, Director, Imperial Institute for Entomology to H. Wilkinson, 25 July 1935.
[88] KNA BV/6/502, Coffee Board Reports, 1937.

Citrus Experimental Station at the University of California Riverside. There he studied a familiar mealybug, *Pseudococcus citri*, the insect from Australia that had afflicted South African and now Californian citrus trees. The entomologists at UC Riverside had only just made their own breakthrough against *citri*. The mealybug had become a serious pest two decades earlier, spreading from San Francisco into southern California.[89] In 1915, Curtis Clausen identified the mealybug as *citri* and immediately entomologists understood it had come from across the Pacific, likely through the ports at San Francisco. By 1927, Clausen and his research assistants scoured Asia for evidence of *citri* – China, Japan, the Philippines – to no avail. That same year, a search through the botanical gardens in Sydney, Australia finally yielded results. It was then that the Americans learned what entomologists in South Africa and Kenya had known a few years earlier – *citri* was from Australia.[90]

Just four years before Le Pelley's arrival, the staff at the Experiment Station in Riverside reported success controlling *citri* with the same ladybug T.J. Anderson had tried in Kenya with no such luck. It is easy to imagine the fruitful conversations between Le Pelley and his colleagues at Riverside, comparing notes about their struggles with mealybug worlds apart. With their help, Le Pelley put *citri* under the microscope and observed that Kenya's mealybug had far more in common with *citri* than *lilacinus*. He had discovered a new species, one he christened *Pseudococcus kenyae*.

New discovery or not, Le Pelley had not yet determined where *kenyae* had come from. While he suspected that *kenyae* would be found back in East Africa, he still had to disprove Marshall's original assertion that *kenyae*, name or not, was an import from elsewhere in the British Empire. From California, Le Pelley left on a whirlwind, eighteen-month tour across the Pacific and Asia, from Hawaii, Japan, the Philippines, Ceylon, and India searching for parasites that might, once and for all, control Kenya's mealybug.[91] His trip was facilitated by long standing, trans-imperial scientific relationships. Le Pelley relied on the hospitality of institutes within the British Empire such as those in India but also those run by the Americans in the Philippines and Dutch in Java. These scientific communities had long worked together, often cordially, hosting one another, sharing techniques, and sending samples for analysis.[92]

At each stop, Le Pelley gathered samples of various parasites, mostly ladybugs and wasps, and shipped them back to Kenya. Back at Scott Laboratories, his colleagues Wilkinson and Frank Notley tested to see whether these parasites would attack *kenyae*. They did not. And as Le Pelley expected, he found no evidence of *Pseudococcus kenyae* in India, the Philippines, or anywhere else on his trip.[93]

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[89] C.P. Clausen, "Mealybugs of Citrus Trees," *University of California Agricultural Experimental Station Bulletin No. 258* (1915), 30.

[90] Harry S. Smith and Harold Compere, "The Introduction of New Insect Enemies of the Citrophilus Mealybug from Australia," *Journal of Economic Entomology* 21 (1928), 664-9; arry S. Smith and H.M. Armitage. "Biological Control of Mealybugs Attacking Citrus," California Agricultural Experimental Station Bulletin 509 (1931), 1-74; and Harry S. Smith and Harold Compere, "Introduced Parasites Successfully Control the Citrophilus Mealybug," *Journal of Economic Entomology* 24 (1931), 942-5.

[91] KNA BV/6/525, H. Wolfe to RH Le Pelley, 26 Jan. 1935; H. Wolfe to RH Le Pelley, 19 Oct. 1935; 20 Nov. 1935; and TNA:PRO T/161/1375, L.S. Smith, Secretary, Colonial Development Advisory Committee, Colonial Office, 27 Feb. 1936.

[92] TNA:PRO CO 533/464/9, Guy Marshall to F.A. Stockdale, 24 March 1936; F.A. Stockdale to Guy Marshall, 25 March 1936.

[93] KNA BV/6/525, Richard H. Le Pelley, Red. Mealy Bug Work, 29 Oct. 1935. South African entomologists did much the same with their American counterparts during their efforts to manage *citri*. Brown, 538.

As it became clear that Le Pelley would not find *kenyae* circulating the Indian Ocean World, his colleagues at Scott Laboratories shifted their attention to locating parasites in East Africa. Le Pelley and Wilkinson increasingly understood that despite its name, *kenyae* could not be from Kenya, or at least the Central Highlands. The mealybug infestation had not just affected coffee planters' estates. In the Gikuyu reserves, families battled with mealybug destroying their yams, sweet potatoes, beans, and peas – crops essential not only to their subsistence but profits at market. Gikuyu reported to agricultural officers that they had never seen this kind of insect before. But they were certain that the bug was spreading outward from Nairobi and settler coffee estates onto their farms.[94]

Le Pelley's research abroad rejected the claim that Kenya's mealybug was a British imperial import, and Wilkinson's local research in the African reserves discounted the idea that *kenyae* was local. And so, entomologists turned westward, looking to Uganda and the Belgian Congo as the home of *kenyae*. Drawing on leftover funds from Le Pelley's Commonwealth fellowship, Wilkinson traveled to Uganda in 1937 where he found *Pseudococcus kenyae* and a host of parasites that kept it in check. He brought back several species of ladybugs and wasps to Scott Laboratories where they were bred in a quarantine laboratory along with those sent from Le Pelley. Wilkinson was stunned to find that the parasites from Uganda distinguished between *kenyae* and mealybugs sent from Le Pelley's travels despite so few differences.[95]

For the next several years, Le Pelley, Wilkinson, and the rest of the entomology team at Scott Laboratories continued breeding the parasites they had encountered on their global and regional travels, testing which might finally bring *kenyae* under control. They received several thousand pounds from Colonial Office funds to build a new insectary, expand the old one, buy equipment like thermostats and refrigerators, as well as pay for the wages of an entire team of African assistants who undertook much of the work. By the end of 1938, they narrowed their search down to four kinds of parasitic wasp from Uganda, which they bred by the thousands. By May 1938, with support from the settler community the entomologists released over 100,000 wasps on forty-eight estates.[96]

A year later, Le Pelley reported a breakthrough. On Thomas P. Wiley's Pennar Farm in Ruiru, the *anagryus* wasp had proliferated leaving behind "mummies," the dried husks of parasitized mealybugs littering the trees. The team had been convinced Wiley's crop would be lost because the infestation had been so bad. Yet *anagryus* saved Wiley's season. Meanwhile, Wiley's neighbor, George Glassford was not so lucky, losing most of his crop to mealybug. Glassford fumed that he did not get his own batch of *anagryus* wasp and needed reminding that he had not bothered to set up an insectary on his estate to house the wasps as the department had requested.[97]

Well into the 1940s, the team at Scott Laboratories continued experimenting with multiple parasites, alongside willing settlers. And the parasitic wasps, especially *anagryus*, continued to show

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[94] A.R. Melville, "Kenya Coffee Mealy Bug Research, *The East African Agricultural Journal* 3.6 (1938): 412-3.
[95] TNA:PRO T/161/1375, R Brooke-Popham, Governor to W. Ormsby-Gore, SSC, 6 Nov. 1937; and CPK, DAAR 1936, 28, 44-6 and DAAR 1938, 35.
[96] KNA BV 6/528, H.B. Waters, Director of Agriculture to Colonial Secretary, Five-Year Plan: Coffee Research, 4 and 18 Aug. 1938; and R.H. Le Pelley, Entomologist, Progress Report on the Mealybug Work and Discussion of Methods, Dec. 1938.
[97] Ibid., Richard H Le Pelley, Acting Senior Entomologist, Progress Report on Mealybug Parasite Work, July 1939.

remarkable promise in controlling mealybug. By the late 1940s, the entomology staff had nurtured and released enough natural predators of mealybug into the Central Highlands to bring the pest under control.[98] It had taken years of study at Scott Laboratories, travel to half a dozen coffee-producing countries, cooperation among scientists working within and between empires, and continued financial support from the colonial state, before the entomologists turned the tide against mealybug. Today *Pseudococcus kenyae* is but a "minor pest," controlled through a combination of natural predators and continued banding.[99]

Conclusion

Coffee lay at the heart of Kenya's settler economy. Despite the well-worn adage of "empire on the cheap" and the relative smallness of Kenya's settler population, considerable expense and violence was spent to keep that heart beating. Science, specifically agricultural science and its technological innovations and extension services, was just as important as the political and economic efforts of the state to nurture its settler population. A robust department of agriculture emerged staffed by trained agricultural experts, whose expertise only deepened over the course of the interwar period. The coffee services conducted experiments and investigated new techniques, inspected coffee estates, and encouraging planters to use the expertise that had been painstakingly gained for their sole benefit. Although the coffee services staff complained about recalcitrant and disinterested planters, many more welcomed the assistance of the department of agriculture, participating in experimentation and employing new techniques.

As much as local relationships and connections between colony and metropole guided the development of coffee science in Kenya; its experts actively sought out information from elsewhere within and well beyond the British Empire. Some of the most important scientific developments of the coffee industry came from studying the techniques of planters and research of experts across the globe, from British India and the dominions of South Africa and Australia to Central America and the United States and its imperial territories. The flows of men like Trench and Le Pelley, the information they learned, or the bodies of thousands of insects were not boundless either. Ultimately, what Kenya's colonial experts could imagine and learn was limited to the ecological world of bourbon coffee – where it could thrive, or more precisely where imperial agents and colonized peoples made it thrive. Eventually the knowledge and techniques developed during the interwar years by the department of agriculture would go on to benefit African coffee planters granted the right to plant *arabica* coffee in the 1950s, and still, to this day, produce some of the best, highest quality coffee in the world.

[98] Hill, *Agricultural Insect Pests*, 92-3.
[99] KNA ARC/8/12, J.W. Waikwa and W.W. Mathenge, Coffee Research Station, Ruiru, "A Review of the Control of Insect Pests of Coffee in Kenya," 1979.