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Digging up Colonial Roots: The Less-Known Origins of the Millennium Seed Bank Partnership

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On 15 October 2009, the Millennium Seed Bank Partnership (MSBP), based in Wakehurst Place in West Sussex, England, announced that they had reached their target of banking the seeds of 10% of the plant species known to Western science fourteen months earlier than they had expected— the goal was set for December 2010, as their campaign slogan "10 by 10" suggested. The accession that put them over the line were seeds of a rare pink banana found in Southwest China, the Yunnan banana (*Musa itinerans*), collected by one of their partner organizations, the Kunming Institute of Botany, Chinese Academy of Sciences (Vaughan, 2009). The MSBP's parent organization, the Royal Botanic Gardens, Kew (henceforth Kew), used the case of the pink banana to highlight two key features of their banking project: biodiversity conservation and food security. While its pinkness was certainly novel, the Yunnan's rarity and the viability of its seeds made it worthy of collection. The Cavendish banana (*Musa acuminata*), the yellow, more familiar cousin that is eaten around the world, has been bred as a seedless clone and, according to Kew, is vulnerable to changes in climate and disease (Briggs, 2018). What makes the pink banana valuable is that it is "wild" and able to reproduce sexually, which, according to neo-Darwinian logic, makes it more robust (Becks & Agarwal, 2010). Kew's action to work with its Chinese partner to save the pink banana seeds at its Millennium Seed Bank was cast as an investment in the future of banana breeding, as well as the conservation of an essential and threatened plant for all of humanity. While the MSBP is a part of Kew's vision to stay at the cutting edge of conservation and environmental governance, its

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relationship to colonial botany and political economy must also be interrogated in the light of its legacy. I revivify the origin story of the MSBP to show how Kew's long tradition of plant extraction, accumulation, and exchange, admixed with a crisis in biosecurity, were integral to the rebranding of Kew as the MSBP.

Founded in 1840, the Royal Botanic Gardens, Kew is entrenched in the history of colonialism and has been well studied as the preeminent site of "colonial botany."[1] Kew has been involved in the extraction, transport, systematization, propagation, and dissemination of plants around the globe.[2] Kew was also instrumental in the proliferation of botanical gardens—from less than 50 to 441 by 1901—where they funded, trained, and administered control over botanic futures (McCracken, 1997, pp. viii, 80). Directors of Kew secured administrative positions for naturalists from the United Kingdom at botanic gardens around the world who would continue the accumulation and circulation to and from Kew Gardens in London. Richard Grove (1995) shows how these directors of botanical gardens became advisors to the newly forming colonial governments, making suggestions about how to best manage the land and natural resources of the area. From its foundation in 1840, Kew maintained its position as powerhouse of botanic knowledge by staying at the forefront of research and by controlling access to the flow of plants. The turn of the twentieth century witnessed the weakening of imperial Britain as colonies started agitating for self-rule. How would a deeply colonial institution such as Kew gain legitimacy and maintain functionality in a decolonizing world that was growing critical of extractive practices?

I argue that Kew's creation of the Millennium Seed Bank Partnership in 2000, as the "leading example of how best to approach and resolve global environmental problems" (Fry, Seddon, & Vines, 2011, p. 53), was an attempt at rebranding. Rather than referencing their legacy as a powerhouse of botanical knowledge gained through the colonial extraction and circulation of plants, the literature and publicity around the MSBP evokes the depoliticized valence of "biodiversity conservation." My engagement with the MSBP follows the practices of extracting seeds from where they grow, moving them across the globe, rendering them legible through subjective laboratory practices, and putting them in freezers for long-term storage. I also study how scientists create new identities, meaning, and value for seeds through inscriptions of data and experimental practice. I am inspired by Michelle Murphy (2017) to uncover these stories because they demonstrate how colonialism endures as a system that structures the valuation of life. My research shows how concepts such as biodiversity, ecosystem services, food security, and extinction are evoked in an era of neoliberalism to continue the colonial practices of extraction, alienation, and re-inscription. Co-opting plants

into "ecosystem services" de-natures them, and splits them into constituent characteristics that are variably valued by their promise of inclusion in breeding programs and commodity markets. Murphy's concept of "economization of life," which links living things to their varied economic potentials, is useful to unravel the histories of the institutions in the twentieth century that converted plants from objects of study, comparison, and economy into genetic resources or "germplasm" to be harnessed (2017, pp. 5-6).

While my research is ongoing, I want to convey that the published history of the MSBP does not capture the depth or particularities that led to its creation but instead flattens the history of Kew to narrow our imaginary about ways of responding to the created crises of climate change and plant life extinction. While their publicized origin story locates the creation of the MSBP as a response to a global crisis in plant diversity, the institutional archives tell a different story. This path, drawn in the swirl of interdepartmental memoranda, passes signposts of identity crisis, bureaucratic drama, funding scarcity, and nationalist fervor.

It starts in the middle of the twentieth century, when Kew's access to plants was threatened by new administrations in the former colonies that did not recognize their authority. Kew's capacity to control the movement of plants, and thus control the knowledge produced about plants, hinged on the maintenance of their two-hundred-year-old collection in London. This collection was split between live plants in the garden, dried specimens in the herbarium, and a cold store of extra seeds that was saved from one year to the next. Kept cool and dry, these seeds could last a year or two before they would have to be used, discarded, or distributed through Kew's extensive network of gardens around the UK and abroad. A seed list with nearly 5,000 entries kept a record and provided an index for anyone interested in ordering from this cache of seeds. To run this list and conduct studies on the physiology of seeds, a new department, the Seed Unit, was formed in 1964, headed by Dr. Peter Thompson. Shortly after starting his job, Thompson received complaints from administrators of gardens that the seeds that were being provided from the existing store were of inferior quality (they did not germinate), and that they were inaccurately identified (a sacrilegious offense at Kew). This was not a problem restricted to Kew's list. In a 1964 article in *Taxon*, botanists complained that seed lists that were circulating from their institutions and others "fail[ed] to justify the expense involved, let alone meet the modern requirements of accuracy, efficiency, and horticultural value" (Howard, Green, Baker, & Yeo, 1964, p. 90).[3] To revitalize and maintain their collection of seeds acquired through Kew's long history of colonial extraction, Thompson petitioned, in 1972, for the creation of a state-of-the-art seed banking facility (see Figure 1)

based on what his own research concluded was the best way to secure seeds in freezers (Thompson, 1970).

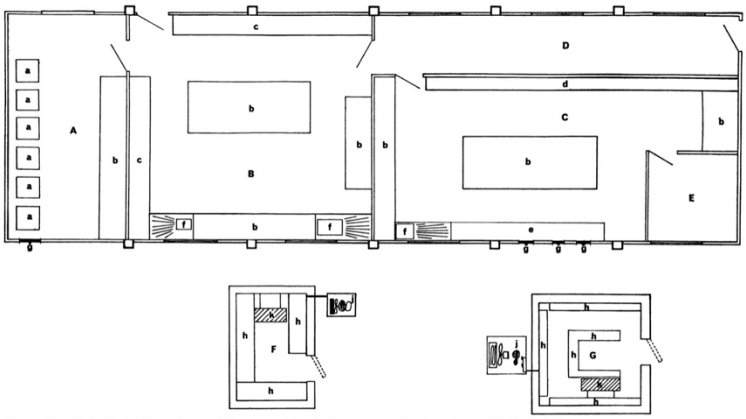

FIG. 1. Plan of the Seed Unit and two cold stores used for banking seed. **A,** Incubator Room; **B,** Seed Testing Laboratory; **C,** General Purpose Room for seed cleaning, sorting and despatch; **D,** Entrance Hall; **E,** Supervisor's Office; **F,** Cool store operating at 0° to 5°C.; **G,** Cold store operating at −10° to −19°C.; **a,** Incubators; **b,** Working surfaces; **c,** Storage racks for records; **d,** Racks for drying freshly harvested seed; **e,** Fume cupboards for seed cleaning fitted with dust extractor fans; **f,** Sinks and draining boards; **g,** Extractor fans; **h,** Storage racks for seed in bank; **k,** Cooling coils in cold stores; **j,** Refrigerator compressor units.

Figure 1. Plan for the Seed Unit (Thompson & Brown, 1972, p. 446).

Although it was the Gardens and Herbarium departments that were reluctant to relinquish control over the seeds, Thompson was told that a lack of funds inhibited any such endeavors. Thompson knew that the director of Kew, Dr. John Heslop-Harrison, had been meeting with representatives of government agencies to solicit funds for the creation of a national gene bank, but it was not until a nationally treasured tree, the elm (*Ulmus*), was threatened by a disease that the funding bodies paid any attention to the value of banking seeds. Dutch elm disease was discovered in the early twentieth century and had been confined to mainland European countries, which saw a 10% to 40% reduction of elms in the 1940s. Similar outbreaks in the United States had also been noted, but in the late 1960s there were signs that it had started spreading to elms in southern England. The disease was caused by a micro-fungus, *Ophiostoma ulmi*, in the first outbreak in the 1940s, and a more virulent *Ophiostoma novo-ulmi* in the 1960s, which was transmitted by two species of elm-bark beetle (*Scolytus*) acting as vectors. It took a few years to kill a tree but the leaves of the elms were the first to exhibit symptoms; they turned yellow and wilted first on individual branches, and then turned brown, curled up, and fell, exposing the bark. The pathogen affects the vascular integrity of the leaves, which causes the roots to block the flow of water through the vascular system (xylem).

Fast growing and hardy, elms had been a good endemic choice for garden landscapes in the United Kingdom.[4] Mature elms, recognizable by their bifurcating trunks, globular treetops, and heights of 115 feet, were considered

aesthetically pleasing and provided abundant shade. As the disease spread, elms seemed to shrivel up as their leaves curled and fell away. The eyesore of elms dying in gardens and avenues threatened to disrupt the vision of control over the environment and signified a sick nation. "Dutch elm disease has assaulted the charm of our shady lanes, depleted our parks, and permanently altered the character of the countryside," wrote Dr. Gerald N. Lanier, a professor of forest entomology (1975, p. X41). What bothered the botanic sensibility was not only that the trees were dying, but that, before they died, the trees first got ugly, marring the pristine land—or city—scape. Lanier continued, in addition to "this aesthetic profanity, the removal of dead and diseased elms (and their replacement) has been an almost intolerable economic burden" (1975, p. X41). As the inevitability of overwhelming loss and increasing cost loomed large, from Kew, Peter Thompson announced hope.

Having inherited a collection of elm seeds from Kew's historic collecting projects, Thompson pointed out that since they had been acquired before the spread of the disease, they were likely to be uncontaminated. He showed that only the seeds that had already been stored in the cold store before the trees showed signs of sickness were safe. Furthermore, Thompson used this collection to legitimate and invigorate the importance of promptly mounting a collection of the seeds of all extant varieties of elm in the British Isles that had not yet been affected by the contagion. This preemptive safeguarding would secure the future possibility of elms to be grown after either the ravages of the fungi had passed, or a cure was found. By 1975, administrators of forestry and horticulture were impressed by this proof of concept and agreed that collecting British flora from the wild was to be made a priority. The national crisis was thus leveraged into a large-scale UK "native" flora-collecting project that was to be the first of many ongoing collections of the seed bank. Within a year, the project grew and turned outward; the crisis in species loss was, after all, global. Identifying reasons encompassing the biological, financial, and political, in a subsequent memorandum Thompson (1974) showed with alacrity that building on the heels of the elm project, foreign collecting was the imperative next step. As the bank grew, they needed more space and required new facilities to house their rimy collections.

Fortuitously, in 1963 Kew had been given responsibility over a vast garden, Wakehurst Place, in West Sussex. Thompson used the availability of this new space and their growing need for expansion to argue for the relocation of the Seed Unit, which had the benefit of being just far enough from the powerful departments at Kew that had opposed his initial plans. By 1975, the Seed Unit was moved to Wakehurst Place, and funding was secured for future collecting

projects, starting local but soon moving to broad-scoped collecting abroad (Kew 1973).

The early collecting expeditions of the Seed Unit were used as starting points and frameworks upon which all future collecting regimes, including that of the MSBP, were built; expeditions are now mounted for a targeted specific collection such as a geographical area (West Africa), or a kind of plant across several spaces (orchids), or even more broadly defined "endangered species." The choice of where to target seed collection is another example of what Murphy (2017) calls the "economization of life," where plant life is selected for "saving" based on a calculus of endangerment, funding, and future worth. Thompson and his successor, Dr. Roger Smith, who became head of the Seed Research and Banking in 1980, and eventually the first director of the MSBP, built on networks that had been established during the long history of Kew but had waned in the post-WWII slump in Kew's outward activities (Fry, Seddon, & Vines, 2011, p. 189). They were armed with a new impetus for collecting that they co-opted from international movements in nature conservation. The colonial legacy allowed them to re-engage the services and access to people and places by promising exchanges of laboratory material and expertise in seed handling, which was very different from the preparation of saplings or cuttings for propagation. When transporting live plants and cuttings, pains needed to be taken to ensure that they would survive their journeys to Kew. Adequate hydration, warmth, and nutrients would need to be packed with the delicately prepared samples into specialized containers, such as Wardian cases, which were invented specifically for transporting living things. While extracting seeds from plants may be laborious and time-consuming, their resilience and natural dormancy makes transporting them comparatively simpler and cheaper; collectors usually just put seeds in cloth or paper bags and send them in the mail. Funding came to the bank from sources as diverse as the popular department store Marks & Spencer, who supported a full-time seed collector position in 1989; the telecom company Orange, which was a significant donor to the newest iteration of the bank as the MSBP; and the Wellcome Trust, which provided a bulk of the funding for the current, eponymously named, Wellcome Trust Millennium Building. Murphy has shown an example of corporations investing in socially responsible causes (in her case, Nike's Girl campaign in Bangladesh) not just to augment their branding by demonstrating that they "care" but also to preempt and mitigate future risks to their own supply chain (2017, p. 126). For Marks & Spencer, the department store that also has a grocery section, investing in the future of plants as food fulfills both targets of brand amelioration and securing the future of food.

Since it opened in 2000, the MSBP has rebuilt—through networks inherited from Kew—its partnerships between local seed collectors and organizations active in over eighty countries (Kew 2015). Now only in their second decade post rebranding, the MSBP claims to have banked the seeds of the largest proportion of plant species in the world and hopes to bank 25% by 2020 (Vaugh 2009). What is effaced in these numerical goals is that the seed collection at the MSBP was built from over two centuries of collections in the gardens at Kew, as well as bespoke seed collecting expeditions throughout the latter half of the twentieth century for the Seed Unit. Connecting the story of the MSBP to Kew's longer history of plant extraction situates the success of their banking 10% of the known plant species within their inherited collections. Thompson's use of the growing international demand for conservation to spearhead a local and then global collecting regime shows how colonial logics of paternalism and responsibility undergird the foundations of projects like the MSBP. Using numbers to represent success in conservation creates an imaginary in which all plants can be counted. Hidden behind the numbers is the imperialist fervor of extraction, the choices of which seeds are banked, what banking entails, from where the seeds come, whether the seeds will be viable when they are retrieved, and, crucially, who names the seeds and will have access to them in the future. All these choices that scaffold seed banking as a means for securing access to plants in the future need to be thoroughly investigated. I, for one, am up to the challenge.

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Notes

[1] For discussion of Kew's continued commitment to botanical acquisition, see Desmond (1982, 1998); Grove (1995); and McCraken (1997).

[2] Between 1871 and 1880, Kew received 2,632 packets of seeds and 32 Wardian cases (sealed glass containers that kept plants alive), and in turn sent 39 Wardian cases and 3,615 packets of seeds to various institutions around the world

(McCracken, 1997, p. 85).

[3] The ubiquity of this problem is made tangible by the collaboration across the Arnold Arboretum in Jamaica Plain, Boston, the University Botanical Garden in Berkeley, California, and the University Botanic Garden, Cambridge.

[4] In the 1799 publication of *The British Garden*, Lady Charlotte Murray's entries for British elms includes five local varieties that provided a range of options of leaf shape, seasonality, and robustness for use in British gardens (1799, p. 213).

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