7 COLLECTING PHOTOGRAPHS, CONSTRUCTING DISCIPLINES: THE RATIONALITY AND RHETORIC OF PHOTOGRAPHY AT THE MUSEUM OF ECONOMIC BOTANY

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Visitors in the early twenty-first century come to the Royal Botanic Gardens, Kew, to view the living plants, the historic glass-houses and more recent visitor attractions such as the Treetop Walkway. There is little indication that the Gardens were once home to a national museum of global significance, the Museum of Economic Botany (hereafter the Kew Museum), or indeed that this museum encompassed a photographic collection that documents the shared histories of imperial botany, photography and public museums in the nineteenth and early twentieth centuries. To date little has been written on the role of photographs in museums of natural sciences. However, in this chapter I consider how photographs functioned in the Kew Museum, how photography found a role within the nascent field of economic botany and what were the 'ideological meta-levels' (Edwards 2001: 28) at play. Photographs, I will argue, formed an essential part of Kew's imperial narrative of 'improvement'. Historian Richard Drayton recounts that in late eighteenth-century Europe the notion of 'improvement' emerged as a supporting orthodoxy for processes of colonization and botanical research (Drayton 2000). According to this view, those who understood nature best were, therefore, best suited to administer territories and their natural and human resources. Photographs made within such colonial contexts and endeavours documented such processes; not only did they depict

the technical superiority of the colonizer but they were in themselves 'acts of technical mastery' (Edwards 2001: 113).

As the history and geography of the collection is reconstructed, it becomes clear that photography was a medium deployed by Kew to 'colonize' economic botany and to make of it a scientific discipline, by which I mean a field of knowledge in its educational aspect. Stephanie Moser argues that museums have unique ways of forming disciplines. They provide contexts for the 'visual consumption' of objects and the disciplines these represent through distinctive conventions of classification and display or 'interpretative frameworks' (Moser 2006: 6). Photography at the Museum of Economic Botany was one such convention.

The birth of the Kew Museum

The Museum of Economic Botany opened its doors to the public on 20 September 1847. The date merits some attention; it was only six years after Kew had become a state-owned public garden and botanical research centre, and, interestingly, six years before it was to have a herbarium. Perhaps, as has been suggested, in applying first for a public museum of economic botany in preference to a herbarium for taxonomic research, Sir William Jackson Hooker (1785–1865), the first director of Kew, had 'trimmed his sail to catch a prevailing wind' (Drayton 2000: 196). But what exactly was economic botany, how was it understood when the Kew Museum opened and how did photographs come to play such a significant role? Hooker himself described economic botany as 'the practical uses and applications of the study of Botany, and the services thus rendered to mankind' (Hooker 1855: 4). In practice, economic botany at Kew concerned the identification of useful plant species throughout the world, the shipment of seeds or seedlings to Kew for horticultural experimentation and their transfer to botanical gardens in British colonial territories, ultimately to be cultivated on plantations owned by British investors and staffed by cheap local labour. Returning to Hooker's definition above, it was, therefore, British 'mankind' in particular who stood to gain most from Kew's involvement in economic botany. According to Hooker, the Kew Museum's purpose was to inform 'not only the scientific botanist' but also 'the merchant, the manufacturer, the physician, the chemist, the druggist, the dyer, the carpenter and cabinet-maker, and artisans of every description' of the variety of plant raw materials available to them through British territories and to suggest possible applications for them (Hooker 1855: 330). By 1910 Kew Museum had grown to occupy four separate buildings: Museum No. 1 Dicotyledons (1857), Museum No. 2 Monocotyledons (1847), Museum No. 3 Timber (1863) and Museum No. 4 British Forestry (1910).[1] But

by 1987 all four museums were closed and the collections re-housed in the Sir Joseph Banks Building.

The Kew Museum and interpretative frameworks

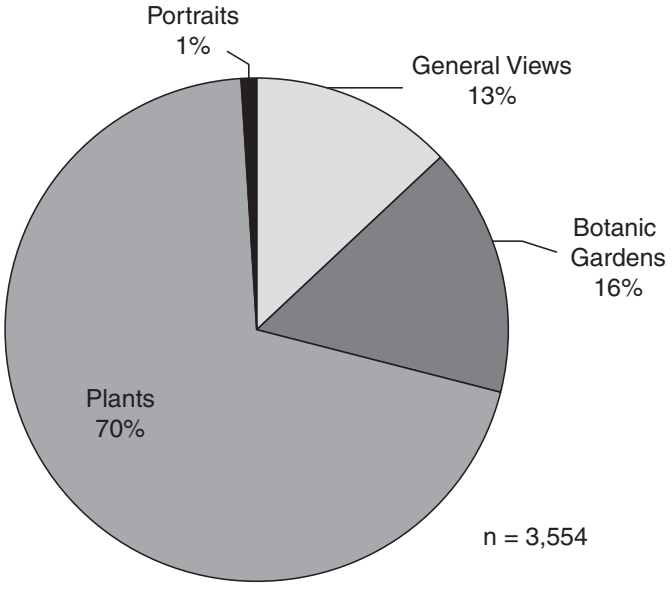
William Hooker's original display concept for the Kew Museum was one of 'the *raw material* (and, to a certain extent, also the *manufactured* or *prepared article*) . . . correctly named, and accompanied by some account of its origin, history, native country' (Hooker 1855: 4).[2] To achieve this, the Kew Museum developed composite display modes consisting not only of botanical specimens but also made objects. A 1902 image of Case 67 in Museum No. 2 makes the point (Plate 7.1). On the lower shelf of the cabinet can be seen the raw material, a length of unfashioned palm wood, alongside the finished goods, a walking stick and parasol handle. This technique of showing an object in various stages of its production was dubbed by Hooker the 'illustrative series'. But beyond this, the Museum utilized interpretative devices from the domestic, academic and exhibitionary spheres, and these included models, maps, illustrations, and photographs. In short, it established interpretative frameworks for the consumption of economic botany.

Case 67 was dedicated to the kokerite palm. The plant was represented by specimens of spadices and fruits[3] and was contextualized in a number of ways, for example through the use of drawn and coloured botanical illustration. Illustration can represent the plant at the various stages in its life cycle, and it can reveal the colours of plants and emphasize particular features (Saunders 1995: 12). It typifies the 'truth-to-nature' approach to representing natural phenomena as described by Lorraine Daston and Peter Galison, in which the artist strives to show 'the characteristic, the essential, the universal, the typical' (Daston and Galison 2007: 20). But to complement this use of illustration the Kew Museum also looked to photography. Photographs formed part of the paradigmatic shift towards 'mechanical objectivity', which occurred in the mid-nineteenth century (Daston and Galison 2007: 121), constituting a concern to represent nature independently of human intervention and hence, so it was understood, of bias. Photography seemed to offer the best means of representing plants as individual specimens rather than as types or as universal 'epitomes' (2007: 121). Above all it enabled the Kew Museum to depict plants in their biogeographical context. Photographs thus helped produce knowledge about species, giving an indication of their variation in scale and form and of their habitat.

The Kew Museum and the formation of a photographic collection

From the 1850s Kew's Museum of Economic Botany began collecting photographs for the purpose of display. Significantly, William Hooker, like Henry Cole, was a member of the Society of Arts during the 1850s when many members were also amateur photographers and where papers were often given on photographic processes (Howarth-Booth and McCauley 1998: 33). So while nineteenth-century botanists working in herbaria generally disdained the use of photography for the purposes of identifying and classifying plants (Daston and Galison 2007: 105), museum men received it more positively and utilized it as an interpretative medium.

Photographs were collected by the museum throughout its public life. They were recorded in the accession registers, indicating their status as museum objects rather than as the ephemera of display. Their main subject matter was plants, including photomicrographs, but the collection also included a subset of photographs of botanic gardens as well as more general views; and finally a small number of photographic portraits of well-known botanists (see Figure 7.1).



Plants:	images of named plants and of their products
Botanic Gardens:	images of Kew past and present, colonial and other overseas gardens
Views:	images of landscapes illustrating the vegetation of named locations, where no specific plant names are given

FIGURE 7.1 Museum of Economic Botany Photographic Accessions 1858–1924 by subject.

Many donations received throughout the 1860s came from private individuals, 'genteel amateurs' who were equally interested in travel and botany. Early amateur photographers were as likely to have been members of the Linnean Society as they were of the Royal Photographic Society and moved – both socially and intellectually – with ease between the two (Tucker 2005: 18). An example of such a donor was 'Harding Esq. of Upcott, Barnstaple' who gave the Kew Museum its first recorded photographic accession in 1858 – an image of a cone of *Cedrus deodora* 'from a tree at Bicton, the seat of the Right Hon. Lady Rolle' (Kew Museum 1855–1861: 344). This image no longer exists at Kew; the earliest extant photograph in the collection, and an example of the 'repurposing' of a photograph, is that of olive trees in the Garden of Gethsemane, donated by traveller James Graham in 1864. Graham was a Scottish photographer who took some of the earliest images of the Holy Land, where he was sent as lay secretary for the London Society for Promoting Christianity Amongst the Jews. The motivations of such donors may have been various, but there was cultural capital to be accrued from donating to a national collection such as the one at Kew. Donors' names were included on museum labels, and such public recognition was a crucial element of contemporary self-fashioning.

By the late 1860s, the camera had become an apparatus of colonial botanic survey, and photographic donations from, among others, Hugh Cleghorn (1820–95) in India and Ferdinand von Mueller (1825–96) in Melbourne reflect this. Cleghorn, dubbed 'the father of scientific forestry in India' (RSA 1899: 734), took many photographs of Indian forests in his capacity as Forest Conservator and Inspector-General of Forests to illustrate the diversity of tree species in the subcontinent and to demonstrate the progress of 'scientific' forestry. In a similar way, photography formed a key role in von Mueller's work as Government Botanist for the State of Victoria, particularly in recording the region's previously unknown flora. As an extension of this surveying trend, photographs became widely used by colonial commissioners in international exhibitions to illustrate the resources of their respective colonies and to present themselves as modern and progressive, all in an attempt to attract emigrants and investment. The images were deployed both as illustrations of colonial life and as signifiers of 'the excellence of the workmanship' being attained in the colony (Commissioner Redmond Barry, 1862, cited in Hoffenberg 2001: 138). They were hung in dense academy-style displays in the various courts; at the 1862 London International Exhibition there were an estimated 600 photographs from Australian states, and they attracted considerable attention (Hoffenberg 2001: 139–41). The Kew Museum requested and received such images at the close of numerous exhibitions, and there can be little doubt that its intention was to present economic botany as similarly modern and progressive.

A range of nineteenth- and early twentieth-century professional photographers is also represented in the collection. Their photographs were repurposed as

botanical and scientific and integrated with those taken by scientists. For instance, a view by Eadweard Muybridge of cochineal beetles being harvested from *Opuntia* cacti in Antigua is an example of an image absorbed into the Kew Museum's own exhibitionary requirements. Thus, in the spatial context of the Museum, photographs from disparate sources were recast as a data set from which scientific knowledge could be produced. Photographs satisfied the three requirements identified by Bruno Latour for knowledge to be accumulated away from the field: they were mobile, unlike the landscapes or large plants they represented; they were stable; and they were combinable, in so far as they were accepted substitutes for the real thing and coexisted with actual specimens in the space of the Kew Museum (Latour 1987).

Photographs and functionality

In considering how photographs functioned in the spaces of Kew Museum, it is necessary to take into account, not only image content and materiality but also the effect of the museum space in determining meaning. Nineteenth-century museums sought to establish scientific authority by 'spatializing science' in a number of ways (Livingstone and Withers 2011: 5): through architecture, displays and the use of particular objects. Objects which might be encountered in a variety of milieu – like photographs – were capable of accruing scientific authority in the museum (Alberti 2009; 2011: 55–62). Photographs functioned as 'boundary objects', 'those scientific objects which both inhabit several intersecting social worlds . . . *and* satisfy the informational requirements of each of them' (Star and Griesemer 1989: 393). In the Museum of Economic Botany this scientific authority derived too from the juxtaposition of photographs and botanical specimens, indeed photographs were used to assert the desired meaning of specimens within a curatorial framework. In the process of meaning-making, however, other factors were at work, particularly the 'subjective interaction' between image, locus and viewer (Edwards 2001: 192). Examination of the Kew Museum's photographic displays by subject matter – portraits, botanic gardens, forestry, and plant cells – enables a teasing out of some of these factors.

In Museum No. 1 was displayed a collection of portraits of 'eminent botanists and travellers' (Oliver 1868: 60). Here photographs appeared in the company of busts, drawings, watercolours and oil paintings, and this adjacency raised the photographs' status to that of art objects. In an illustration of the gallery can be seen a photographic portrait of Charles Darwin by Julia Margaret Cameron, donated by the botanist Worthington G. Smith in 1881. Collectively the portraits formed a botanical pantheon of Kew's own making in which Kew scientists featured as the natural successors to a long line of botanical 'greats' (Figure 7.2).

FIGURE 7.2 Portraits of 'eminent botanists and travellers' in Museum No. 1, c. 1900. Photograph: Edward Jonathan Wallis. © Copyright The Board of Trustees of the Royal Botanic Gardens, Kew.

Photographs of Kew and other botanic gardens constitute 18 per cent of all photographs accessioned over the period from 1858 to 1924. A display of these could be seen in Museum No. 3, as Joseph Hooker announced in his annual report for 1878:

> In No. 3 Museum a stand with a number of swing-frames has been placed, in which a large collection of views of the Royal Gardens in earlier stages of their history have been placed, and also a series of photographs of various colonial gardens. (RBGK 1879: 50)

By 1886 this sub-series had grown to occupy two stands at opposite ends of the building, and by 1893 the display was described in the guidebook as a depiction of 'the history and development of the Royal Gardens' (RBGK 1893: 83). The Hookers' interest in displaying such a collection of images is not explicit, but a clue lies in John Lindley's 1838 report on the future of Kew Gardens, which was adopted by William Hooker as Kew's charter in 1841. In that document Lindley had written of the proliferation of colonial botanic gardens, whose 'utility is very much diminished by the want of some system under which they can all be regulated and controlled'. Kew was to act as a centre, with the colonial gardens 'reporting

constantly their proceedings, explaining their wants, receiving their supplies, and aiding the Mother Country in everything that is useful in the Vegetable Kingdom' (Lindley 1840: 20–21). The display of images of colonial botanic stations and gardens acted as a demonstration of that system, signalling Kew's botanical predominance and authority. But beyond this illustrative function, photographs, like plants, were active agents in the development of centre-periphery relations between Kew and colonial gardens, bringing into existence new networks of knowledge exchange.

Photographs of trees, such as that of the olive trees already noted, comprise the earliest photographic accessions to the Kew Museum. Among plant specimens, a block of wood is least able to convey the scale or morphology of the living plant, and images provided the portability required for successive 'cycles of accumulation' (Latour 1987). By the opening of Museum No. 4, the Museum of British Forestry, in 1910, photographs were being deployed variously according to a range of envisioned audiences. This museum, a response in part to the findings of the 1902 Forestry Committee report, reflected an interest by government and other agencies in improving the productivity of British forestry (Munro-Ferguson 1902). The Kew Museum was innovative in that it was zoned to cater for the requirements of multiple audiences: 'working foresters', would-be land agents and students of forestry on the newly formed courses at Oxford, Cambridge and Edinburgh – the future cadre of forestry experts. Room 3 was arranged according to Bentham and Hooker's *Genera Plantarum* taxonomic system, 'to assist the student rather than the worker of timber' (RBGK 1919: 6), and it seems likely that the Museum's growing collection of photomicrographs was displayed there. Photomicrographs are photographic images taken by a camera attached to a microscope, enabling the production of images at previously unknown levels of magnification. The history of photomicrography is contemporaneous with that of photography, indeed William Henry Fox Talbot is credited with taking the first photomicrographs using a solar microscope (Overney and Overney 2011: 2). By the 1880s advances in camera technology meant that organisms could now be imaged at the cellular level (4–6) and this was to have major implications in botany for the identification of plants, particularly of woods.

As already noted, the assemblage of displayed photographs in the Kew Museum constituted an important component in the creation of an identity for the emergent discipline of economic botany – one which spoke of modernity and mechanical objectivity – and in distinguishing it from other branches of botanical science. And no photographs spoke more of scientific modernity and objectivity than the photomicrographs that the museum began to collect from 1872. The first of these came from two chemists: Professor Edward Kinch of the Royal Agricultural College, Cirencester, and Dr James Campbell Brown of the Royal Infirmary School of Medicine, Liverpool. This indicates the strong connection between early

photography and chemistry (Tucker 2005: 42–46), as well as early applications of photomicrography in biological anatomy and pathology. Campbell's work as public analyst of Liverpool, for example, required the identification of food pathogens by means of microscopic analysis, and photomicrographs enabled him to circulate his findings through teaching and publishing. As the commercial sector also turned to photomicrography to aid the identification of new raw materials, later donors to the Kew Museum included materials broker John Christie and Liverpool timber merchant James A. Weale.[4] At the Kew Museum, the interests of science and commerce blended in the discipline of economic botany, and photomicrography was, therefore, a particularly appropriate medium to express the hybridity of the subject. At the same time, the Kew Museum provided a new, more permanent context for this medium than temporary exhibitions or ephemeral publications could permit. In a Darwin-saturated world, the intricate forms and patterns revealed in photomicrographs proved to be a source of wonder to Victorian audiences, who were as likely to judge them on their aesthetic, as on their scientific merits. A reviewer of the Photographic Society's exhibition of 1889 described the photomicrographs on display there thus: 'the work shows with incredible subtlety of detail . . . infinitesimal objects in a manner which can only be compared – and the comparison is inadequate – to the finest Venetian or Brussels point-lace' (Anon. 1889: 10).

Indigo: A narrative of process and progress

As well as indicating the appearance of the living plant at both micro- and macro-levels, photography was employed at Kew to demonstrate methods of processing plant raw materials. A 'series of photographs illustrating the [indigo] industry in India' are a case in point (RBGK 1907: 60–61). Used to demonstrate the transformation of the species *Indigofera tinctoria* from fibrous plant to 'the blue of the laundress', the photographs were situated alongside the indigo specimens in Museum No. 1. By this time, Museums 1 and 2 had been rearranged according to the Bentham and Hooker taxonomic system; indeed to walk through the museums in the prescribed order was to perform the classification system that had been designed at Kew and extended across colonial botany. Thus the indigo specimens – leaves and dye – and their accompanying photographs were all given equivalence as members of the *Indigofera* genus in the *Gonnaraceae* family.[5] The images were donated by analytical chemist Christopher Rawson FIC, FCS in 1900. Rawson had toured the Indian district of Bihar in 1898 at the invitation of the Bihar Planters' Association, with a view to improving indigo manufacture and cultivation. Four of the images (Seed sowing', Beating – old

style', Pressing the slabs' and 'Cutting the cake into cubes') are from the 1877 series 'The Planting and Manufacture of Indigo in India' by Oscar Mallitte (see appendix for full list) . Oscar Jean-Baptiste Mallitte, a Frenchman by birth, arrived in Calcutta in 1857 and was soon commissioned as photographer to the British Government.[6] Indeed his photographs have been described as a 'visual approximation' of the way the British saw both India and Indians (Das 2012). Mallitte's indigo photographs were commissioned as part of a 'visual propaganda assault' launched by the Planters' Association to counter negative reports of the way they conducted their business in India (Pinney 2008: 58). As Christopher Pinney has argued, the images were designed to depict indigo cultivation as 'a universe of unlimited good' and indigo factory production as a 'carefully regulated system' (59).

However, the spaces of indigo cultivation and production were in reality sites of conflict between colonizer and colonized. Indian farmers were coerced into growing indigo in place of subsistence crops and indentured labourers were kept in permanent debt, 'locked into a system akin to slavery' (Balfour-Paul 1998: 72). Pictorial representations of indigo production date from at least the seventeenth century, and Pomet's 1694 illustration of enslaved workers in the French West

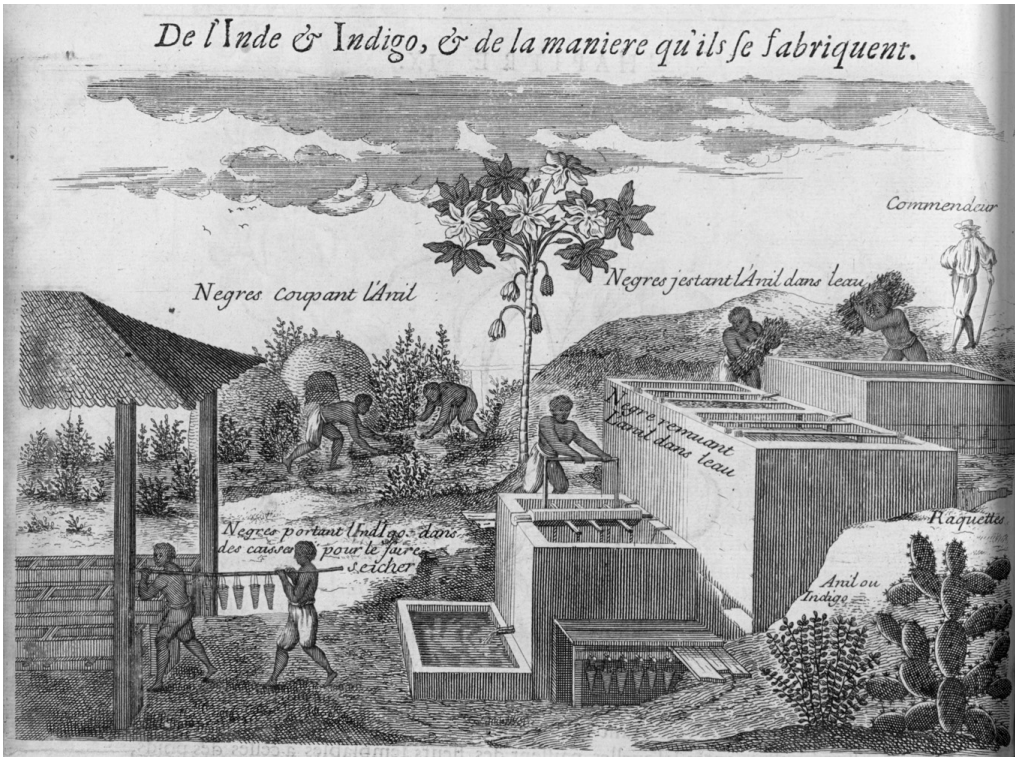


FIGURE 7.3 Indigo production in the French West Indies, illustrated in Pomet's *Histoire générale des drogues*, 1694. © Copyright The Board of Trustees of the Royal Botanic Gardens, Kew.

Indies (Figure 7.3) establishes an enduring trope of such representations, that of the white owner or agent overseeing his ranks of indigenous labourers.

The photographs accord with these tropes, presenting a model of discipline and order in which the panoptical perspective of the European is omnipresent. At the same time these spaces held a strong fascination for Europeans and not only because of their commercial potential. Images of 'native' workers offered metropolitan audiences exciting opportunities to further their interests in the natural history of humans (Qureshi 2011) and were as often sources of wonder as they were symbols of imperialist control, both of which were narratives inscribed in the Museum of Economic Botany.

One of Malitte's images, 'Beating – old style', is, to present-day sensibilities, particularly arresting and unsettling (Figure 7.4).

In this scene indigenous labourers are beating fermenting indigo in order to stimulate oxidation. They are immersed in the raw material, indeed they are barely distinguishable from it. From the Kew Museum's perspective, the workers' presence in the photographic frame was almost incidental to the narrative of transformation – from cultivar to commodity – that it aimed to tell. However, to the nineteenth- and early twentieth-century visitor, it is likely that the toiling beaters were objects of fascination, perhaps prompting recollections of, and reflections on, contemporary debates ranging from science to slavery (Qureshi 2011: 8).

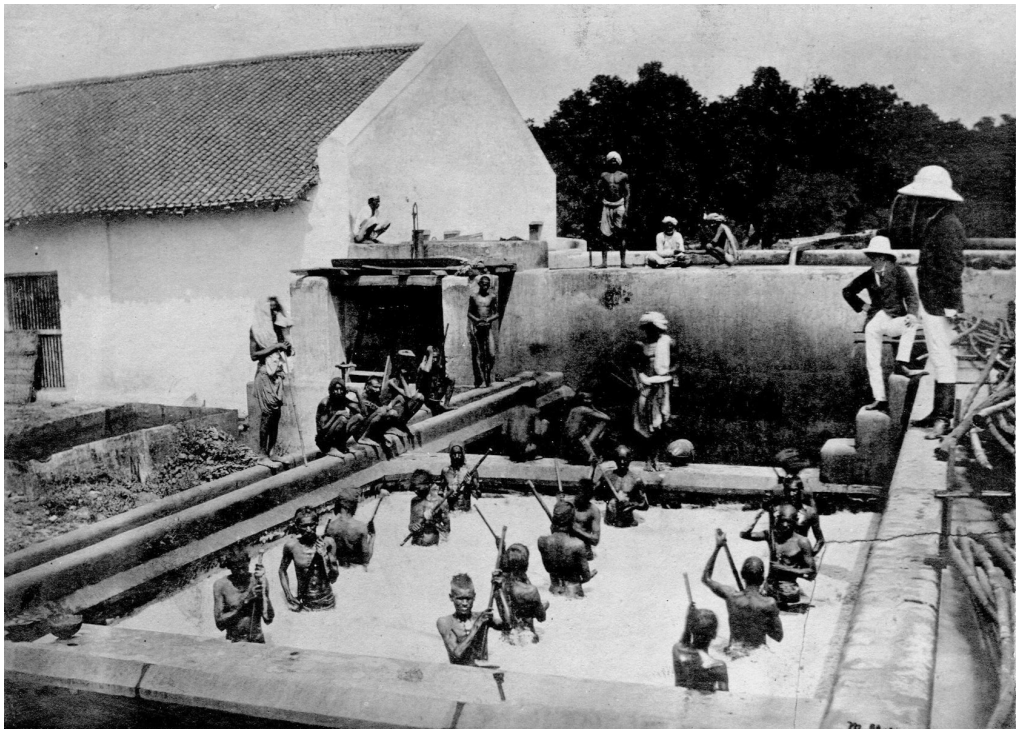


FIGURE 7.4 Indigo production. 'Beating – old style'. Photograph: Oscar Mallitte, 1877.

But to what extent did the materiality of these images – their plasticity and their presentational form – inform these reflections? They still bear the remnants of their mode of presentation from their days in the Museum: measuring 142 mm×108 mm, the black tape on the reverse suggests that they were once mounted, perhaps in black. But equally important is the issue of how they were read in the museum space. Museum displays of photographs, like albums, have 'performative qualities'; they 'narrativise' photographs, requiring them to be viewed in a particular sequence (Edwards and Hart 2004: 11). The relatively small size of the indigo images probably dictated that viewers drew closer in order to read them, and this conforms to the idealized visitor viewing behaviour depicted in the first Kew Museum guide of 1855 (Figure 7.5).

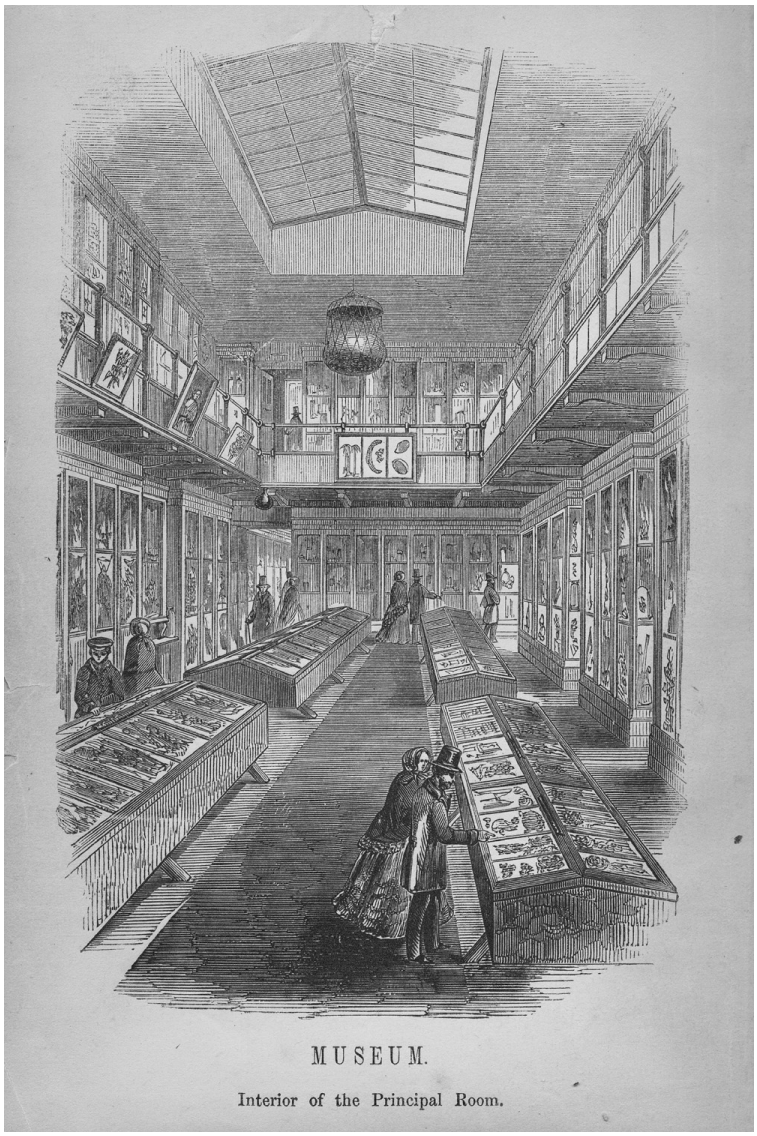


FIGURE 7.5 The Museum of Economic Botany, 1855. © Copyright The Board of Trustees of the Royal Botanic Gardens, Kew.

Here the couple in the foreground present the practice of meaning-making in the Kew Museum as both gendered and shared. In keeping with mid-Victorian notions of what constituted a 'respectable' woman in a public space, note that while there are single men in this scene, there are no unaccompanied females. The male visitor points confidently to the exhibit, taking the lead in interpreting the display, but there is also some suggestion of discussion, of an exchange of ideas between the two. Again, like the album, the museum display links the viewers physically and determines the social relations of viewing (Edwards and Hart 2004: 11). The images have become discussion points in the Kew Museum, partaking in flows of knowledge between discipline and visitor at which the Museum aimed.

By the end of the nineteenth century audiences to Kew's Museum of Economic Botany had grown beyond William Hooker's original expectations, both in number and in diversity. They included not only the scientific and trading classes but also 'the industrial class', especially mechanics and artisans often in organized groups who, 'with their families, (on full days) crowd[ed] the museums to suffocation' (RBGK 1872: 2). Kew was accessible to all in that it offered free entry[7] and was open on Sundays from 1853. Visitors' purposes in viewing the Kew Museum between 1900 to 1960, when the indigo photographs were on public display, were multiple: intellectual curiosity – after all, William Hooker had envisaged the Museum from its inception as 'a deposit for all kinds of useful *and* curious vegetable products' (Hooker 1855: 3, emphasis added); the seemingly universal popularity of botany;[8] the popular aesthetics of photography (Tucker 2005: 22–33); the thirst for 'intercultural encounters and topical events' (Qureshi 2011: 8); and perhaps, too, the quest for self-improvement and 'self-help' (Smiles 1859).

The captions used to interpret the images in the Kew Museum are still present on the reverse of the prints, and in the table below they are compared to the captions on the complete collection held at the Natural History Museum, presumably conferred by the Planters' Association (Figure 7.5). Textual inscriptions on, or accompanying, photographs form part of the photograph's plasticity. They are traces of 'shifting patterns of ownership, organisation and use' (Edwards and Hart 2004: 59), revealing the multiple lives and framings of the photograph as object.

The Kew Museum appears to have adapted its own textual descriptions to the needs of its heterogeneous public audience. Technical terms such as 'ficula' were replaced with the more colloquial 'slabs'; and words were added for clarity, so that 'seed sowing' was substituted for 'sowing'. The Museum extended its textual inscriptions through the medium of the guidebook. The Kew guide furnished a full description of the process in vernacular language, a further attempt to fix meaning:

> Obtained principally from three or four species of *Indigofera* by soaking the plant in large masses in tanks. After its removal, the water is stirred and beaten with paddles, its colour passes to a blue, and the suspended particles settle to

the bottom forming a blue mud, which after the water is drawn off, is dried in the sun and cut into cubes. (RBGK 1907: 60–61)

As is so often the case, detailed first-hand accounts of the response to the indigo displays, and how the images (together with their captions) were received, are lacking. What is clearer is the message that the Kew Museum aimed to communicate through the use of photographs such as these. In the spatial and ideological contexts of this museum, the images were designed to act as a narrative of economic botany in action, in which indigenous labour and plant raw materials on the one hand, and British investment and management on the other, came together in the name of utility to produce imperial wealth. This forms part of a tradition of representing the British Empire that was to reach its zenith in the early twentieth century with the establishment in 1902 of the Colonial Office Visual Instruction Committee (COVIC). Under the leadership of geographer Halford Mackinder (1861–1947), COVIC'S task was to produce lantern slides to instruct the children of Britain about their Empire and the children of the Empire about the 'Mother Country' (Ryan 1994: 157). Like the photographic output of COVIC, the indigo photographs in the Kew Museum aimed to depict both 'the native characteristics of the country and its people and the super-added characteristics due to British rule' (Mackinder cited in Ryan 1994: 159). In short, this was a narrative of improvement.

Conclusion

Bringing photographs together into a single collection was an attempt to create 'immutable mobiles' in order to produce scientific knowledge (Latour cited in Edwards 2001: 132). At the Museum of Economic Botany these photographs came from a variety of photographers: amateurs, missionaries, colonial officials, fellow scientists and commercial photographers, both as repurposed images and as special commissions. And they came – as gifts, exchanges or purchases – through a range of distributive channels: academic and research institutions, international exhibitions, commercial enterprises, publishers, naval and diplomatic networks, botanic gardens, dealers, learned societies and government departments. By their integration into a museum collection that was organized according to botanical systematics, the photographs, too, became systematized, identified by the family, genus and species of which they were visual representations. Indeed, the photographic collection of the former Museum of Economic Botany, though now far from the public gaze among Kew's research collections, is still organized by botanical genus. The indigo

photographs are, therefore, to be found under the letter 'I' in a folder dedicated to the genus *Indigofera*.

So how was the scientific knowledge produced in Kew's Museum of Economic Botany shaped by the presence of photographs? At the 'meta' level, photographs of Kew and colonial gardens portrayed Kew as the 'mother-garden' at the centre of a botanical empire, while photographic portraits positioned Kew botanists as the 'natural' heirs to a long tradition of plant scientists. All helped to construct Kew as an authoritative voice in matters of botany. At the level of content, photographs showed the living plant in its natural habitat. This was vital information to potential investors and growers, and it represents a certain 'interactivity' at work in the Museum: if a particular palm flourished in the Amazon rainforest, might it not do likewise on plantations in tropical British India or the Caribbean?

Second, photographs were used to demonstrate agricultural and sylvicultural techniques that were otherwise beyond the spatial and representational capacities of the museum. They were capable of collapsing time and space within the museum's confines. And third, as is most evident with the indigo images, they illustrated the processes by which plants were transformed into finished goods.

Photography was a resource deployed by Kew to form economic botany as a discipline and as a field of knowledge that could be consumed within the exhibitionary context of the museum. At the same time, systematic botanists did not, and still do not, utilize a photograph of a living plant as a substitute for one that is dried, pressed and mounted on a herbarium sheet. The mechanical objectivity of the photograph claimed by advocates of photography was, it must be emphasized, a contested issue from its earliest days (Daston and Galison 2007: 123–24). But the Kew Museum embraced photography and economic botany at an early stage in their parallel trajectories; indeed there is evidence here to suggest that their histories are connected in a number of ways. In the context of the Kew Museum, photography spoke to visitors of scientific objectivity, of modernity and of the future and presented economic botany as the most modern and utilitarian area of plant sciences. It spoke the language of 'improvement', which continued to provide the rationale for colonization and for state-funded science in nineteenth-century Britain

APPENDIX

Comparison of captions used for Indigo images at Science Museum and at Kew

Science Museum	Kew Museum
*Planters' bungalow	
*Measuring land for cultivation	
*Turning up the land	Ploughing
*Sowing with drills	*Seed sowing: the drills
*Cutting and loading indigo	
*Indigo factory	Indigo factory
*Loading a vat with indigo	Loading steeping vat
*Indigo factory	
*Beating an indigo vat by hand	*Beating: old style
*Beating an indigo vat by machinery	
*Apparatus for beating indigo vats by machinery	Beating wheel
	The beating vat, showing froth
*Indigo boilers and ficula table	Filtering table and boilers
*Indigo press house	Presses
*Pouring the ficula into boilers	
*Pressing the ficula	*Pressing the slabs
*Indigo drying house	Drying house
*Cutting indigo into cakes	*Cutting the cake into cubes
*Boiling water in a time of drought	
*Persian wheel	
*Indigo beaters	

Comparison based on the captions used at the Science Museum, which holds a complete set of the Mallitte images. *Malitte image. Other images: photographer unknown.

Notes

1 The fact that the first museum to open was subsequently dubbed Museum No. 2 deserves explanation. Museums 1 and 2 were arranged in taxonomic order, initially according to de Candolle's 'natural' system (Candolle 1852). In this system dicotyledons, or plants with two-seed leaves, preceded monocotyledons (plants with one-seed leaves). By walking through the two museums in the prearranged order the visitor embodied de Candolle's taxonomic system.

2 Emphasis in original.

3 Spadix (pl: spadices): Spike of flowers closely arranged round a fleshy axis and usually enclosed in a spathe.

4 John Christie of Ide and Christie, Mark Lane, London EC.

5 Now in the *Leguminosae* family.

6 He was invited to join a British expeditionary party to the Andaman Islands in 1857 as volunteer photographer, and he was the official photographer to governor-general Lord Canning's tour of the Northwest Frontier in 1858 (Anderson 2009: 157).

7 Until 1916 when a one penny admission charge was imposed.

8 See, for example, Anne Secord's article on artisan botanists, 'Science in the pub' (Secord 1994).

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