Curating Science in an Age of Empire

Kew's Museum of Economic Botany

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Submitted for the degree of PhD

Declaration of Authorship

I Caroline Cornish hereby declare that this thesis and the work presented in it is entirely my own. Where I have consulted the work of others, this is always clearly stated.

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Abstract

This thesis considers the history and significance of the Museum of Economic Botany at the Royal Botanic Gardens, Kew, focussing especially on the period from its opening in 1847 to the eve of the First World War. Looking specifically at the Museum's collection of wood specimens and artefacts, it seeks to understand the nature of economic botany during this period, and to evaluate the contribution made to the field by the Kew Museum. Through examination of the Museum's practices, networks, spaces, and objects, it sets out to address the question: how do museums produce scientific knowledge?

Part One sets the context. Chapter One provides a brief historical account of nineteenth-century economic botany and the Museum. Chapter Two offers a critical overview of literatures on Kew and economic botany; on the role of place in the production, circulation, and reception of scientific knowledge; and on the role of the public museum in Victorian science and culture. It also outlines the conceptual framework of the thesis. Chapter Three presents an account of the methodology and sources.

Part Two highlights museum practices. Chapters Four to Six are devoted respectively to the practices of 'exhibition' (the spatialities, rhetorics, and rationalities of display); 'instruction' (the educational uses of museum objects); and 'supply' (the circulation of objects).

Part Three turns to specific objects and their biographies. Chapters Seven and Eight trace respectively the production, circulation and reception of a totem pole from British Columbia and a timber trophy from Tasmania, to demonstrate how objects acquire diverse meanings in diverse contexts, and how they are used to impart meaning to particular sites. In conclusion, Chapter Nine reflects on the cumulative findings of the thesis and on its potential outcomes, and it looks beyond the thesis to recommend areas for future research and practice.

Acknowledgements

For a long time now I have thought that this was a history which needed to be written, and I am thrilled that the opportunity to do so has fallen to me. Two individuals in particular have created that opportunity and I wish to thank them here. Firstly Dr. Mark Nesbitt, curator of the Economic Botany Collection at Kew, whose enthusiasm is ever contagious and whose encouragement empowering; and secondly Professor Felix Driver of Royal Holloway, University of London, who has expressed unshakeable belief in the project from the start and opened up for me new ways of seeing the Museum of Economic Botany. I wish also to acknowledge the institutions of which they form part: Royal Holloway for awarding me a Thomas Holloway Research Scholarship and supporting my research in so many ways; and the Royal Botanic Gardens, Kew for permitting extensive access to their collections, staff, and infrastructures of communication.

Like the Kew Museum which forms its subject, this thesis is the product of a dispersed and mutable assemblage of people and things. Many others have also served to shape it, both by their questions and answers: archivists, librarians, academic scholars, interviewees, museum practitioners, and fellow researchers. And others still, like the Royal Historical Society, have provided additional funding which has enabled additional research. To all of these I extend my appreciation.

Finally I wish to thank my family – John, Edward, and Florence Cornish – for their seemingly infinite support and tolerance.

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PART ONE

Contexts

PROLOGUE

A 'happy Hookerian idea'

'Economic Botany', wrote Edmund Saul Dixon in *Household Words* in 1856, 'has been totally neglected as a branch of popular education'.[1] He went on:

> Young gentlemen destined to travel, who have had it birched into them that the nymph Daphne was metamorphosed into a laurel, and that the pheasant's-eye flower sprung from the blood of Adonis, would find it just as useful to be able to recognise the foliage of the teak and mahogany-trees, the berry of the coffee, or the stem of the Peruvian bark (Dixon 1856a, 375).

Dickens' *Household Words*, a periodical ever-sensitive to the popular preoccupations of its time and place, had hit on a new focus of public interest. At the time of writing the article, the Museum of Economic Botany at the Royal Botanic Gardens, Kew, had been open for nine years, although it had only held that title since 1852 (Desmond 2007, 185). The term 'economic botany' was in circulation again, in a new, state-funded context which had particular implications for botanic gardens, herbaria, and museums.

This short extract contains a number of themes which became increasingly pertinent to the field of economic botany during the nineteenth century: educational reform, in which subjects like economic botany were to appear on

[1] The Rev. Edmund Saul Dixon (1809-93): contributor to *Gardeners' Chronicle*, *Bell's Weekly Messenger*, *Quarterly Rev*iew, *Titan*, *Cornhill*, and other periodicals; author of Dixon 1854, 1855, 1856b. Source: Dickens Journals Online. Accessed 28 August 2012 at: http://www.djo.org.uk/indexes/authors.html

school curricula for the formation of 'imperial citizens' (Ploszajska 1999); the significance of 'imperial careering' as an option for young men (Lambert & Lester 2006); the importance of botanical knowledge to explorers, colonisers, and settlers; and utilitarian attitudes to scientific knowledge. It is the Museum of Economic Botany which lies at the heart of the article's subject matter, however, and in introducing it, Dixon introduces another key theme – the role of the museum in public education.

The economic-botanical knowledge produced in the Museum at Kew is described here using the example of the newly 'discovered' Paraguayan tea, maté. Visitors learnt that maté was not actually a member of the tea family but of the holly; and furthermore, 'Economic Botany tells us whither to send for it, presents us with a woodcut of the foliage, and exhibits to us maté cups and tubes, used in drinking the infusion' (Dixon 1856, 377). So the display, with its textual inscriptions, illustrations, and ethnographic artefacts, furnished the botanist, the grower, the importer, the retailer, and the general public with the botanical, geographical, commercial and cultural knowledges necessary to translate a hitherto unknown South American shrub into an imperial opportunity.

The advantage of knowledge acquired in a museum was one of scientific authority; in the Museum of Economic Botany merchants might find 'what hitherto they had often sought in vain – at least a truthful clue to, and some reliable information respecting, the raw materials used or useable in their respective trades'. The Kew Museum itself, on this view, was ostensibly impartial and disinterested; its role was to disseminate knowledge whereas previously knowledge on useful plants – their provenance and their cultivation – was jealously guarded by those in possession of it. Thus the Museum, in making its knowledge available to 'all the world', took a stand against 'the aggressions and intolerance of all sorts of selfish mystification and humbug'

(Dixon 1856, 378). But the Kew Museum, by virtue of its position within the Royal Botanic Gardens, also offered a further advantage: the museum specimen was cross-referenced to the living plant which was visible in the gardens or hothouses, affording the visitor 'twofold gratification and redoubled instruction'.

The *Household Words* article introduced another feature of the Museum of Economic Botany, one which may come as a surprise to early twenty-first-century readers. It was a surprisingly interactive space, not in terms of buttons, crankshafts, or levers, but in the way it appealed to the visitor to provide 'missing' knowledge and specimens. For example, information was solicited on gums; indeed, 'the several specimens of gum resins...the origin of which is not known, are so many advertisements entreating you to help them to find their next of kin.' It seems highly appropriate that he here used the commercial language of advertising in the context of this burgeoning branch of 'economic' science, whilst at the same time the extended familial metaphor references botanical classification. Similarly, the Museum held timber specimens which required identification – or as Dixon phrased it, 'to discover the outward semblance of the trees which cut up well into ornamental woods, and die worth a great deal of money' (Dixon 1856, 378)![2]

The sense one receives on reading this description is of a science still in its infancy, and of a 'still adolescent' museum, acting as both a space of knowledge exchange and a dynamic site of knowledge production. Knowledge deficits co-existed alongside knowledge narratives in the authoritative context of the Museum. It articulated a structure of knowledge in which gaps had their place like boxes to be filled with the 'right' kind of knowledge – knowledge 'of which we should yet have remained in utter ignorance but for the formation of this

[2] See Chapter Eight for further details on these woods.

garden and museum'. It is with 'this museum' – this 'happy Hookerian idea' – that this thesis is concerned. Like the *Household Words* article, the thesis will consider economic botany in the nineteenth century as a branch of popular education promoted as a means of furthering imperial prosperity and of creating an imperial citizenry. At its core is Kew's Museum of Economic Botany, the first to bear that name, and a history of how, by bringing together spaces, objects, texts, and people, it became a major force in the production and circulation of new economic-botanical knowledge and in the creation of economic botany as a discipline in the long nineteenth century.

CHAPTER ONE

Museums and Disciplines

> The utility of this Museum to mankind at large...is testified by the remark of not a few visitors, "Now we see, for the first time in our lives, and on a large scale, a *practical* application of the *science of Botany.*"
>
> Hooker 1855, 7

This thesis examines the Museum of Economic Botany at the Royal Botanic Gardens, Kew, focussing on the period from its conception to the outbreak of World War I. It seeks to provide an understanding of the nature of the scientific knowledge that was produced in its spaces and across its networks; to define the mechanisms through which that knowledge was produced; and to describe the ways in which the Museum contributed to the field of economic botany. It does this through a syncretic research methodology designed to give equal weight to a number of elements – practices, objects, and networks. Its perspective shifts between the micro-level which concerns itself with specific objects and spaces, and the macro-level which situates the formation of the Economic Botany Museum and its collection within the broader contexts of science, empire, and museums in the long nineteenth century. Such an approach highlights the multiple agents involved in the process of constructing

and re-constructing the Museum over time and space, resulting in a re-creation of the Museum as a dispersed and mutable assemblage of people and things.

Geography is therefore essential to the writing of this history; it both underpins the spatial analysis of the Museum site(s), and permits a view of networks in which agency is awarded to human and non-human actors – specifically to museum objects. This introductory chapter outlines two key historical contexts which inform all that follows thereafter. Section 1 sketches the contours of economic botany as a sub-field of knowledge within botany from the 1830s to the early twentieth century. There are two key arguments here: firstly, that economic botany was not a new subject in the mid-nineteenth century, but that at that time, and due to the confluence of a number of factors, it took on a specific form and operated in specific ways. Secondly I suggest that the Museum of Economic Botany preceded a range of institutions in rendering economic botany an educational subject – in short, in creating of it a discipline – and thus shaped the way it was approached by subsequent botanists. Section 2 provides an historical account of the Museum from its embryonic stage to the opening of the fourth and final element in the complex in 1910. Here I emphasise the collaborative nature of museum practice by re-inscribing into the narrative the contributions made by curators, and by considering the active engagement of museum visitors in processes of knowledge production.

1. Economic Botany: the making of a discipline

> If we compare the state of Botany at the end of the last century with its present condition, we shall find that it has become so changed as scarcely to be recognised for the same science.
>
> John Lindley 1833, 27

It has been said that botany was always economic.[1] Certainly the oldest surviving botanic gardens at Padua and Pisa in Italy were founded in the middle of the sixteenth century as 'herb gardens' whose primary purpose was to grow the plants necessary to the medical science of the time (Walters 1981, 1). And European voyages of reconnaissance and conquest from the sixteenth century onwards were concerned with, among other matters, the quest for new plants which subsequently formed the basis of new economies (Drayton 2000). Perhaps it is not surprising that the emergence of the term 'economic botany' has its origins in Enlightenment science. The first published work in which economics and botany were explicitly associated was Linnaeus's *Flora Oeconomica* of 1748. This work, with its focus on the economic uses of Swedish plants, may be seen as a manifesto of Linnaeus's botanical cameralism (Koerner 1996, 138). In its turn it spawned a series of 'floristic catalogues' by northern European botanists, describing the uses of plants in the authors' homelands (Wickens 1990, 13).[2]

If we consider the origins of the Royal Botanic Gardens, Kew in the physic garden established by Princess Augusta in 1759, it becomes clear that economic botany was inscribed in Kew's spaces from its earliest days. From 1772 when George III invited Banks to advise him on his garden at Kew, the latter saw an opportunity to make of Kew 'a great botanical exchange house for the empire'

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[1] Kapil Raj, *pers. comm.*, August 2011

[2] Suckow 1777; Hornemann 1796*;* Buc'hoz 1800*;* Ludwig 1800; Billberg 1815

(Banks 1787, cited in Drayton 2000, 108). His aim, epitomised in the breadfruit project, was to transplant economic crops between the East and West Indies. Kew benefitted from the Banksian era in a number of ways: it became intimately involved with imperial expansion through its own gardeners who were often sent on Admiralty-sponsored expeditions; it became effectively a national collection, receiving specimens from around the world; and it became in turn a supplier of plants and people – gardeners and botanists – to British colonies, thereby expanding its own sphere of influence to global dimensions (Drayton 2000, 85-128).

Following the deaths of George III and Banks himself in 1820, royal interest in colonial botany waned and there followed a period of decline at Kew, which, if it serves no other purpose, underscores the fact that networks are fragile and need to be consistently practised in order to survive (Latour 1987). But in 1838 the Lindley Report recommended Kew's transfer from royal patronage to the public purse 'for the promotion of Botanical Science throughout the Empire'.[3] William Hooker, who became the first director of the new, state-funded Kew, adopted botanist John Lindley's recommendations as Kew's unofficial charter.[4] Under Hooker's aegis Kew was once again directly and indirectly involved with nineteenth-century voyages of exploration which brought back new plant specimens and products and, in a sense, 'kick-started' economic botany at this time. By the mid-nineteenth century – an era characterised as much by free trade as the Banksian era was by mercantilism –

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[3] The National Archives (TNA), Public Records Office (PRO) WORK 6/297 *Report of Committee on Expenditure and Management of the Royal Gardens. Vol. 1*

N.B. This original report refers to several royal gardens, and is extant in manuscript form at The National Archives. In 1840 the section relating to Kew was re-issued as a parliamentary paper – 1840 (292) *Botanical Garden (Kew). Copy of the Report made to the Committee appointed by the Lords of the Treasury in January 1838 to inquire into the Management, &c. of the Royal Gardens at Kew*. It is from this that citations have been drawn in the thesis.

[4] For a timeline of Kew directors and Kew Museum curators see Appendix II.

the link between economic botany and imperial expansion appeared inextricable.

Lindley's words, cited above, were uttered in an 1833 address to the BAAS in which Lindley looked back to the changes which had taken place in botany since the passing of the Linnean age, but also forward to a new, scientific era of utilitarian science. Lindley was certainly in the best position to make these observations; he had figured in Georgian economic botany, having been employed by Banks in 1819 in his library and herbarium at Soho Square. By Banks's death, Lindley had already completed important works on roses, *Digitalis*, and apples.[5] In 1829 he was awarded the chair of botany at London University,[6] and immediately began to raise the status of university botany from 'an elegant accomplishment' to 'a serious occupation' (Thiselton-Dyer 1889, 686).

Before entering into the history of the Museum of Economic Botany, this section considers the space occupied within nineteenth-century plant science by economic botany. Although a full epistemological history of economic botany is beyond the scope of the thesis, some understanding of its changing morphology over this period is necessary if we are to evaluate the contribution of the Kew Museum. What interests us here is the resurgence of economic botany as a term and sub-field of botany in mid-nineteenth century Britain, particularly the spaces in which it was constructed and the actors who moved to 'colonise' it and to make of it a scientific discipline. By 'discipline' I infer a field of

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[5] Richard Drayton, 'Lindley, John (1799–1865)', *Oxford Dictionary of National Biography*, Oxford University Press, 2004; online edition, May 2009 [http://www.oxforddnb.com/view/article/16674, accessed 4 September 2012]

John Lindley (1799–1865): doi:10.1093/ref:odnb/16674

[6] 'London University' here refers to what is now University College London, which name it took in 1836. Any references to London University after that date refer to the federation of London colleges now known as the University of London.

knowledge *in its educational aspect*. The process by which a science subject comes to be taught or teachable involves the formulation of a body of observed facts, systematically classified and brought under a set of general laws. And to this I add the dimension of a community of practitioners sharing a 'core intellectual project', practitioners equipped with competencies and knowledges which are recognised both by the community and by those outside it as requisite to pursue a given core project (Whitehead 2009, 8-9).[7]

Writers on nineteenth-century science have discerned distinct phases in the creation of disciplines: amassing and displaying collections; identifying disciplinary content and methods of study; defining the discipline's relation to other knowledges, but also delineating its specificity; forging a subject-specific language for a defined community of practice; producing 'objective' data through the use of instruments; establishing paid subject-specialist posts; publishing in dedicated journals; issuing statements of authority and credibility; demarcating spaces for observation and demonstration; imagining consumer communities; and creating representational strategies (Dias 1998; Whitehead 2009). And others have demonstrated how disciplines are formed in museums in quite specific ways (Yanni 1999; Moser 2006; Whitehead 2009; Alberti 2009, 2011). Stephanie Moser argues that museums provide contexts for the 'visual consumption' of objects and the disciplines they represent through distinctive conventions of classification and display or 'interpretative frameworks' (Moser 2006). In the mid- to late nineteenth century museums preceded university departments in establishing numerous subjects as disciplines, including Egyptology, archaeology, anthropology and, I argue, economic botany. Furthermore, in providing these contexts or interpretative frameworks, museums in turn influenced scholarly understandings of particular fields and served to structure subsequent study by universities and

[7] For more on communities of practitioners see Wenger 1999.

others (Moser 2006, 1-9). Museums are primarily concerned with the use of objects in representing ideas, but images, text, and data were also appropriated for particular ends in the Museum of Economic Botany.[8] What becomes overwhelmingly clear, however, is that it was not inevitable that the Kew Museum would take possession of the field at this point; this was a contested area representing a number of constituencies.

The term 'economic botany' is first known to have appeared in print in the English language in the 1830s and its appearance then can largely be attributed to one individual, Gilbert Thomas Burnett (Figure 1.1).[9] Burnett was appointed as the first professor of botany at King's College London in 1831.[10] He defined botany as 'one grand division of natural knowledge, distinguished as a separate science' with three 'subordinate departments': philosophic botany, systematic botany, and economic botany or 'vegetable utilities' (Burnett 1832b, 371-72). Burnett died in 1835 but he represented a new interest in economic botany which was further reflected in Lindley's 1838 report on the future of Kew (described in more detail in Chapter Three),[11] and in Lindley's 1849 text book, *Medical and Oeconomical Botany*. Then, in 1853 there followed Thomas Croxen Archer's *Popular Economic Botany*.[12] Archer declared the botanical information in his book as 'slight' (Archer 1853, vii), grouping plants according to their uses rather than their taxonomic order. So from where, botanically-speaking, did it spring? In his preface the author

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[8] This section on museum/knowledge relations is preliminary and the argument is addressed in more theoretical terms in Chapter Two.

[9] See Anon. 1833, 1835, 1836; Burnett 1832a, 1832b, 1833, 1835

[10] A. M. Lucas, 'Burnett, Gilbert Thomas (1800–1835)', *Oxford Dictionary of National Biography*, Oxford University Press, 2004; online edn, Jan 2008 [http://www.oxforddnb.com/view/article/4073, accessed 8 Oct 2012]

Gilbert Thomas Burnett (1800–1835): doi:10.1093/ref:odnb/4073.

[11] TNA PRO WORK 6/297 *Op. cit.*

[12] "economic, n. and adj.". OED Online. September 2012. Oxford University Press. 1 October 2012 <http://www.oed.com/view/Entry/59384?redirectedFrom=economic+botany>.

acknowledged prior works on botany and *materia medica* by William Hooker, John Forbes Royle, John Lindley, and Jonathan Pereira, and their individual contributions to the formation of mid-nineteenth century economic botany will be touched upon in this chapter.[13] Hooker himself, in his essay on botany in the Admiralty's *Manual of Scientific Enquiry* (Hooker 1849), had acknowledged the work of Royle, Pereira, and chemist Robert Dundas Thomson, corroborating the idea that a community of practitioners was active at this mid-century point, with a shared core project of reconstructing economic botany along contemporary lines of disciplinarity and specialisation, and according to contemporary social and political imperatives.[14]

However, *Popular Economic Botany* represented a new approach to popular botany and its author represented interests beyond Kew. Archer trained as a surgeon but found employment with the Liverpool Customs Office. He later taught botany at Liverpool Medical School and at Queen's College, Liverpool, and he also developed exhibitionary interests. He was responsible for the botanical collection of the Liverpool Royal Institution, and in 1851 had organised the Liverpool exhibit at the Great Exhibition. In 1860 he was made director of the Edinburgh Museum of Science and Art. Therefore like William Hooker he had experience of the academic and exhibitionary milieux; in addition he had served time at the 'sharp end' of economic botany, at Britain's second port into which there arrived daily a steady stream of new plants and plant products from overseas in need of identification and assessment (Hillier 1907). Archer appears in many ways to have commanded a position of authority within the renascent field of economic botany, as it emerged in

[13] Some of the publications with economic content available to Archer were: Hooker 1827-65, 1830-42, 1841, 1842-48, 1843, 1849-57; Royle 1834, 1837, 1840, 1842, 1847, 1849, 1851; Lindley 1830a, 1830b, 1832, 1834-37, 1838, 1840, 1846, 1849; Pereira 1839, 1842, 1849.

[14] Similarly, Lindley (1849) acknowledged Pereira, Royle and also Robert Christison.

Britain in the mid-nineteenth century, heralding a new era of interest in the utility of plants, an era characterised by capitalism and free trade, empire, scientific specialisation, and state-funded science.[15] Furthermore he assumed this position from a regional centre; this is important because the history of economic botany in the nineteenth and early twentieth century is in part one of a struggle for ascendancy between regional and metropolitan scientists and institutions. *Popular Economic Botany* was a commercial and pedagogical success.[16] Its writing had been prompted by the displays of economic plant products at the 1851 Exhibition (Boulger 1889, 16) and this serves to underline two related areas – other than the Kew Museum – for the development of economic botany in the mid-nineteenth century: national and international exhibitions, and the literature of popular science.

Exhibitions

The connection between the construction of Victorian economic botany and the planning and legacy of exhibitions, both national and international – a connection which hinged on a common context of objects, display and networks – is a recurrent motif of this thesis. In the 1830s and '40s national exhibitions in Europe were a subject of great interest in Britain, particularly those of France and the Zollverein in 1844. They featured a heterogeneous range of objects, from raw materials to machinery and manufactures (GE 1851, 23-29). At the same time there was a burgeoning exhibitionary movement in Britain. Exhibitions at the Mechanics' Institutes in Manchester (1837) and Birmingham (1849) also featured 'models of machinery, philosophical instruments, works in fine and useful arts, objects in natural history and specimens of British

[15] This is not, however, to imply British exclusivity in the field; Duchesne (1846) was a notable Belgian work of the same period, and Candolle (1855), published in Paris, has led at least one writer to name its author 'the founder of economic botany' (Wickens 1990, 14).

[16] It was, for example, adopted by the Board of Trade as the textbook for the Schools of Practical Science at Marlborough House (RBGK Archives, DC 33, ff.60-61), and in 1854 an abridged version was produced for schools (Archer 1854).

manufacturers, etc.' (Kristensen 2007). In the metropolis, there had been a renewed emphasis on science in the service of industry at the Society for the Encouragement of Arts, Manufactures and Commerce (RSA) since Prince Albert took on the presidency in 1843 and since the arrival of Henry Cole (Becker 1875, 62).[17] In 1847 the Society held an exhibition at RSA House which, it claimed, was the first 'exhibition of select specimens of British manufactures and decorative art'. Subsequent exhibitions were held in 1848 and 1849. An extract from the catalogue for the 1848 exhibition gives an indication of how economic botany was framed at such events:

> Three specimens of soap, made from a new Vegetable Oil, obtained by expression from the seed of a tree known to the Native Indians as the 'Mowah' and to Botanists as '*Bassia Latifolia*'. The tree is common in the Northern and Central parts of India and in the province of Behar. The timber is of good quality for some parts of ship-building, and from the flower a cheap and powerful spirit is distilled.[18]

A key defining feature of an emergent discipline is the coining of a subject-specific language (Dias 1998, 42), and there are a number of elements here which were to become conventions of the literature of economic botany: details of both botanical and indigenous names, geographical provenance, and modes of production. Whilst this passage has a distinct commercial timbre, however, other institutions such as the Kew Museum were to appropriate such data into a more scientific framework.[19]

By the time of the Great Exhibition of 1851, therefore, there was amongst the community which coalesced around the RSA a considerable degree of

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[17] The Society became known as the Royal Society of Arts etc. when it received its royal charter in 1847, but for purposes of brevity, it will be referred to throughout as the RSA.

[18] RSA Archives SC/EX/I/77 *A Catalogue of Specimens of Recent British Manufactures and Decorative Art, Exhibited at the House of the Society of Arts, 19, John Street, Adelphi, London*

[19] See 'Museum guide-books', Chapter Three.

accumulated knowledge on the exhibition of plant raw materials and their products, and a tradition of categorising the great diversity of objects which constituted arts, manufactures, and commerce. So the four classes adopted at the Crystal Palace – manufactures, machinery, raw materials, and fine arts – did not mark the start of a new exhibitionary culture but were rather the cumulative result of earlier experiences at home and abroad. William Hooker was an active member of the RSA community in the 1840s and '50s, doubtless as a contributor to the body of knowledge on economic botany but also as a beneficiary, and was thus able to apply lessons learnt from previous British and European events to his own Museum at Kew.

Exhibitions came with their own literature, not only the official catalogues and guide-books, but also a vast array of commercial titles, some lavishly illustrated. Exhibitions were widely reported on in newspapers and periodicals, many of which produced their own 'souvenir' supplements. These too were spaces for the formation of economic botany, not only reflecting the objects on display, but providing additional knowledge and arranging objects into a coherent whole –geographically or processually – that might be less apparent to the visitor on the ground. And as seen in the case of Archer's book, the ever-expanding range of vegetable products made available to a fascinated British public through exhibitions led to the growth of a new sector of popular science literature, one which emphasized the commercial utility of plants (Archer 1853; Boulger 1889; Jackson 1890). While such literature was aimed at a non-specialist readership, the specialists were also endeavouring to colonise economic botany via processes of institutionalisation, as reflected in the activities of a number of learned societies.

Learned societies

> At this present time we have no society which deals specially with this subject [of economic botany]. At one or two of our existing societies papers are occasionally read on vegetable products, but what is really wanted is a society, or section of an existing society, which would give its attention systematically to this very important branch of the science of botany.
>
> James Collins, F.B.S. Edin. 1872

Collins's call for a specialist society representing the needs of those engaged in economic botany was never realised in Britain. The longer-established learned societies, such as the Royal Society, the Royal Institution and the Linnean Society remained crucial to scientists throughout the nineteenth century as sites for the formation of 'a self-validating consensus' (Morus *et al*. 1992, 129-31), but they were not principally concerned with economic botany. However several institutions did provide fora where issues of plant economy could be discussed. For example, from its foundation in 1754 the RSA had been dedicated to the improvement of agriculture as well as to 'arts, manufactures and commerce', and its system of 'premiums' was designed to encourage innovation in agriculture and industry. In 1852 it launched the *Journal of the Society of Arts* to circulate the knowledge presented at its meetings and exhibitions. Kew directors and curators were frequent contributors to its pages which they shared with writers representing a range of interests.

From the 1830s London was also the site of a 'startling proliferation' of more specialised societies (Morus *et al*. 1992, 131). James Collins, whose paper to the RSA is cited above, was curator of the museum at the Pharmaceutical Society of Great Britain, another body keen to further the interests of economic botany, particularly of *materia medica*. The Society was founded in 1841 to 'benefit the public, and elevate the profession of Pharmacy, by furnishing the means of proper instruction' (cited in Holloway 1991, 92). Its Professor of *Materia Medica*, Jonathan Pereira, was instrumental in increasing

pharmaceutical knowledge of crude drugs, new varieties of which were arriving in Britain in unprecedented quantities from British territories overseas. In *Popular Economic Botany* Archer had acknowledged Pereira's contribution to the field: 'No one has done so much as Dr. Pereira towards dissipating the cloud of ignorance which envelopes [*sic*] the history of vegetable products' (Archer 1853, v). It was a bold claim which illustrates the not inconsiderable extent to which the Pharmaceutical Society had 'colonised' economic botany in the 1840s and '50s.

A further site for the development of economic botany was the Royal Botanic Society (RBS), formed in 1838 for 'the Promotion of Botany in all its branches, and its application to Medicine, Arts, and Manufactures, and also for the formation of extensive Botanical and Ornamental Gardens within the immediate vicinity of the Metropolis'.[20] Funded by subscription, it leased ground inside the Inner Circle of Regent's Park and planted a garden arranged according to the taxonomy of Swiss botanist, Augustin Pyrame de Candolle – the same taxonomy which was later adopted at Kew (Candolle 1852).[21] Queen Victoria was an avid supporter of the RBS, awarding it a royal charter in 1839, and it is alleged that Victoria's first banana was a gift from the Society (Drayton 2000, 160). By 1840 the RBS was courting a fashionable crowd through its popular flower shows (Figure 1.2) but by 1907, however, it appeared to be in crisis as a scientific institution. According to garden historian Alicia Cecil, it had become 'almost impossible to keep up the Botanical side and at the same time make a bid for popular public support by turning the grounds partly into a Tea Garden' (Cecil 1907, 99). It survived until 1932, when it failed to secure a renewal of its lease.

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[20] City of Westminster Archives Centre, Records of the Royal Botanic Society of London, Reports to the Council RBS/1 1855-99

[21] *Prodromus systematis naturalis regni vegetabilis* was published in individual volume form during Candolle's lifetime, beginning in 1824, but only finally completed after his death by his son, Alphonse, and the full eight volumes published in 1852.

Another institution established in this period of institutional proliferation and to some extent a forum for discussion of economic-botanical matters was the British Association for the Advancement of Science (BAAS), founded in 1831. Initially botany shared the stage at BAAS meetings with zoology, indeed it was was not represented as a separate discipline until 1895 when Section K was established. Prior to that, as part of Section D – Zoology and Botany (Biology from 1866) – a number of economic botany papers was given in the 1840s, '50s, and '60s.[22] However, with the advent of the 'new' physiological botany in the 1870s (see below), interest in economic affairs amongst BAAS botanists appears to have declined. Ultimately, economic botany was jockeying for position amongst a host of other interests at the BAAS, and it cannot be claimed that as a field of knowledge it developed in significant new ways under those auspices. The same cannot be said of economic botany in British universities, although their response came somewhat later in the century.

Universities

Botany had been taught at the University of Oxford since 1669, at Edinburgh since 1676, at Glasgow since 1704, and at Cambridge since 1724. William Hooker was himself Regius Professor of Botany at Glasgow from 1820 to 1841 prior to becoming Director of the Royal Botanic Gardens, Kew. However, university botany in the first half of the nineteenth century was an optional course in most cases, and existed largely for the purpose of aiding medical students in the study of *materia medica*. This was to change, though, with the introduction of botany at London University. As holder of the first botany chair at London, John Lindley's 1829 inaugural lecture outlined his vision for a botany which was new in two aspects: firstly there was to be a greater emphasis on morphology and anatomy, and on 'the laws under which [plants]

[22] For example: 1840 Dr. A. Burn 'On the growth of cotton in India'; 1852 Professor Royle 'The black and green teas of commerce'; 1866 Clements Markham 'Cinchona cultivation in India'.

live, and grow, and propagate'; and secondly on plant identification. This new type of botany would be useful, not only to physicians and apothecaries at home, but all the more so to the medical man on a 'foreign station'; Lindley was clearly looking to new imperial opportunities for funding and research. Botany, he continued, was similarly valuable in agriculture, which depended on the laws of vegetable physiology, and in horticulture, without which botany was 'the mere act of committing seed to the earth, and of reaping the produce' (Lindley 1829, 22). One of Lindley's notable achievements was to introduce Jussieu's natural system to botany teaching at London (Jussieu 1789),[23] thus effectively rejecting the 'polite' botany of Linnaeus – a botany which became increasingly associated with the amateur naturalist (Secord 1994; Shteir 1996) – in favour of a more utilitarian science.[24] Lindley's botany was utilitarian in terms of its Benthamite ideology, its content, and its objective – to 'shape a new man, a new kind of botanist, a scientific practitioner', in short, to train professionals for a new 'world of knowledge' (Shteir 1996, 156-57). Two years later, as alluded to above, King's College London also introduced a chair of botany with the appointment of Burnett in 1831 and here economic botany formed a constituent part of the botany lecture schedule, along with systematic and philosophic botany (Burnett 1832b, 371-72). This, too, was an attempt to raise the status of university botany and develop it as a discipline.[25]

In the second half of the century, and partly in response to events at London University, the nature of university botany elsewhere in Britain began to

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[23] Jussieu was the first botanist to publish a 'natural' classification of flowering plants.

[24] Natural system: 'all points of resemblance between the various parts, properties, and qualities of plants shall be taken into consideration; ...thence an arrangement shall be deduced in which plants must be placed next each other which have the greatest degree of similarity in those respects' (Lindley 1846, vii)

[25] However economic botany's place on the curriculum at King's was short-lived; the subject was not continued under Burnett's successor, David Don (Don 1836). Furthermore botany did not become a single degree subject at Kings until c. 1910; prior to that it formed part of a general science degree programme and was available to medical students from the 1880s (Lianne Smith, KCL Archives, *pers. comm*., 20 August 2012).

change. In 1861 botany became part of the new Natural Sciences Tripos at Cambridge, where it had previously been an unexamined subject. Greater numbers of botany graduates from British universities began to undertake post-graduate research in Germany and brought back new theoretical and institutional perspectives. This in turn fostered the spread of the 'new botany' (Bower 1938, 36) – a botany which was German in origin and distinctly physiological in orientation, which took place in laboratories and deployed specialist equipment such as microscopes, but which was not primarily concerned with the economic aspects of plants.[26]

Economic botany as a separate course was not introduced into the colleges of London University until 1904, by which time Kew's Museum of Economic Botany had been in existence for over half a century. In 1904, William George Freeman, Superintendent of the Colonial Economic Collections at the Imperial Institute, was invited to deliver a course of lectures in which he described economic botany as 'a practically new subject in the botanical curriculum of London University' (Freeman 1905, 75). It is interesting that Freeman, an economic botanist whose career was to follow a colonial, rather than an academic trajectory, was chosen to lecture, and demonstrates the vacuum of expertise on economic botany within universities at that point, and the extent to which the Imperial Institute had taken the high ground in the field.[27] Freeman's description of economic botany at his inaugural lecture indicates a more circumscribed discipline compared to William Hooker's original definition of 1855:[28]

> Economic botany comprises the study of the plants and plant products, which directly or indirectly are of service to man,

[26] For a fuller description of the 'new botany' see Chapter Seven.

[27] See pp. 265-66 for more details

[28] See page 47

> including their source, distribution, improvement, collections and preparation, their properties and uses' (Freeman 1905, 75).

It is equally interesting that Freeman made no reference to Kew in his lectures, suggesting a decline in Kew's leadership of the field from its position fifty years previously. As Livingstone argues, the field of scientific enquiry had greatly diversified by the end of the nineteenth century, with claims for 'cognitive authority' staked by a range of institutions, including the new research universities (Livingstone 2003, 40).

British universities proved to be more fertile ground for the development of sub-fields of economic botany, notably agriculture and forestry. They were responding to the demand for specialists to serve at home and abroad and to the funding opportunities offered by the Board of Agriculture, established in 1899. In 1885 William Schlich – former Inspector-General of Forests for India – had established a forestry section at the Royal Engineering College at Coopers Hill, with the aim of training foresters for the Imperial Forestry Service.[29] Calls for the universities to do likewise ensued. Isaac Bayley Balfour of Edinburgh University appealed to university botanists to take the lead 'for the propagation of the scientific knowledge upon which this large industry must rest' (Balfour 1895, 681). Edinburgh University established a forestry lectureship in 1889, part-funded by a Board of Agriculture grant, as did the Royal College of Science at Newcastle. In 1905 the Commonwealth Forestry Institute opened at Oxford University and in 1907 both Cambridge and Aberdeen established forestry readerships (Tsouvalis 2000, 23-32).[30] Likewise in agriculture, in 1899 the Cambridge School of Agriculture was founded and the University of London opened its own School of Agriculture at

[29] See discussion on this in Chapter Five

[30] This is not intended as an exhaustive list; rather it focuses on those institutions which saw themselves as preparing students for colonial, as well as domestic careers.

Wye.[31] Oxford University had had the Sibthorpian chair of rural economy since 1796 but in response to these more recent developments,[32] it introduced the Agricultural Economics Research Institute in 1913, with the aid of a Ministry of Agriculture, Fisheries and Food Development Commission grant.

But aside from agriculture and forestry, by the early twentieth century economic botany, where it existed in British universities, had been subsumed into the field of economic biology. Despite the generality of its name, economic biology was strongly orientated towards agriculture. It encompassed both economic zoology and economic botany, the former becoming synonymous with entomology, the latter with mycology. Regional universities – Birmingham, Manchester and Bristol – made a series of moves to claim it as their own, but ultimately it was the metropolitan institutions which came to dominate. Imperial College in particular was the recipient of generous government funding for economic biology and its scientists, notably botanists John Farmer and Vernon Blackman, were to enjoy considerable influence within British life sciences (Kraft 2004).

Publications

By 1882, journal articles and text books on economic botany constituted such a sizeable literature that it was possible to publish a bibliography listing hundreds of titles (Jackson 1882). Demand for such titles came from the academic, research, commercial, pedagogic, and 'popular' sectors of the reading public. As with its Museum, Kew was an early mover in the field. William Hooker's *London Journal of Botany* (est. 1842) contained 'such plates as recommend themselves by their novelty, rarity, or history, or *by the uses to*

[31] Some regional universities also established agriculture courses, usually to serve the needs of their region e.g. Aberystwyth c.1892; Aberdeen 1897; Reading 1897

[32] However, no professor was appointed until 1840 (Brock & Curthoys 1998, 545).

which they are applied in the arts, in medicine, and in domestic economy'.[33] However, it was a short-lived venture, withdrawn in 1857.[34] Thirty years later at the 'high noon' of the British Empire, Thiselton-Dyer, from his position as Director of the Royal Botanic Gardens, introduced a new journal specifically for the dissemination of economic-botanical knowledge. The *Bulletin of Miscellaneous Information* was a monthly publication which contained the results of investigations undertaken at Kew and at 'kindred institutions at home and abroad' on vegetable products and their plant sources, 'carefully summarized and presented in as concise and clear a manner as possible'. The *Bulletin* enjoyed an international circulation; its readership included officers of colonial botanic gardens, stations and research institutes, and private individuals with commercial interests in plant products (RBGK 1891, 63-64). As a site for knowledge exchange, the *Bulletin* was almost too successful; Brockway relates that it was due to information printed in the *Bulletin* that Germany became the first imperial nation to profit from the cultivation of sisal (Brockway 1979, 168). The *Bulletin* often worked in conjunction with the Kew Museum, announcing new acquisitions, publishing lists of desiderata, and cross-referencing articles on particular plant species with specimens held in the museum collections. Many articles were written by the curators, affording a voice to non-academic practitioners of botany. It belonged therefore, along with the Museum, to Kew's economic botany complex. The *Bulletin* remained an important space for the construction of economic botany in the twentieth century, outlasting the Kew Museum to whose own history we now turn.[35]

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[33] Emphasis added

[34] From 1849-57 it was replaced by *Hooker's Journal of Botany and Kew Garden Miscellany*.

[35] The *Bulletin of Miscellaneous Information* was in print until 1941. From 1946 it continued as the *Kew Bulletin*.

2. The Museum of Economic Botany

> My object in presenting the best portion to the Garden is to induce Lincoln to form a Museum in which such things may be deposited and then I think a Herbarium will be required, and if once begun it will not be on a trifling scale.
>
> William Jackson Hooker 1845 [36]

In November 1845, William Jackson Hooker wrote to his father-in-law, the botanist Dawson Turner, regarding his plans to donate one hundred and eight of his own botanical drawings – 'the best portion' – to Kew. Hooker had an ulterior motive: he was bidding for a botanical museum at Kew. In a later letter to Turner, Hooker revealed a more personal motivation: 'I had hoped in a short time to form such a collection as to have afforded an opening for an Assistant.'[37] The candidate he had in mind was his son, Joseph Dalton Hooker. Joseph Hooker did not become Assistant Director until 1855, but Lincoln's successor as First Commissioner of Woods and Forests, Viscount Canning, was quicker to nod through the museum plan and the world's first Museum of Economic Botany opened to the public at Kew on 20 September 1847.[38]

Precedents

It appears that the idea of a museum at Kew pre-dated Kew's re-incarnation in 1840 as a botanical apparatus of state. According to Frederick Scheer, it had been the plan of Sir Joseph Banks, 'once eagerly entered into by George III' (Scheer 1840, 50), but disrupted by the deaths of Banks and the King in 1820. Nothing materialised until William Hooker took on the directorship of the Royal Botanic Gardens in 1841. The first published reference to the Museum

[36] Letter from William Hooker to Dawson Turner 22 November 1845; RGBK Archives, WJH/2/10, f.60

[37] Letter from William Hooker to Dawson Turner 13 December 1845; RGBK Archives, WJH/2/10, ff.61-62

[38] RBGK Economic Botany Collection (EBC), Museum Entry Book 1847-1855, p. 1

was in Hooker's 1851 annual report where he referred to it as a 'Museum of Vegetable Products' and it was not until 1852 that it was dubbed the more familiar 'Museum of Economic Botany' (Desmond 2007, 185).[39] The name may have been inspired by the Museum of Economic Geology, established at Craig's Court, Whitehall in 1835 which owed its existence to Henry de la Beche, director of the Geological Survey of Great Britain. De la Beche, a keen advocate of popular science, persuaded the government that the Survey 'possessed great opportunities of illustrating the application of geology to the useful purposes of life' (Cunningham 1850, 347). In this, too, he may have stimulated Hooker's own vision of popularising the science of botany through a museum at Kew. Furthermore, the Museum of Economic Geology was under the stewardship of the Department of Woods and Forests, Kew's own governing department. In 1851 the Museum moved to purpose-built premises on Jermyn Street, and its name was changed to the Museum of Practical Geology (Bellon 2007, 318). It seems likely that at this moment Hooker saw his chance to appropriate the rather catchier epithet of 'economic botany' for his growing museum. Indeed, he may have taken inspiration from more than the name; although little detail remains of the layout of the Craig Court museum, we know that the collections which were transferred from there to the new museum in 1851 included specimens tracing the progress of minerals from extraction to manufactured products, and that the collection was arranged systematically according to geological periods, a practice which continued at Jermyn Street (Bellon 2007, 319) (Figure 1.3). To walk through the displays in the correct order was, therefore, to traverse the history of the earth.

But there were other precedents. The importance of colonial botany to the development of the discipline of economic botany in Britain must not be underestimated. Many colonial gardens were in existence before Kew became

[39] The first accession register or 'entry book' is simply headed 'Museum opened to the public 20th September 1847'.

public in 1841, and had developed ways of conducting, evaluating and reporting on their experiments. And many colonial learned societies and individuals amassed collections which came to be displayed in museums. For example the India Museum – the museum of the East India Company – was first established in the EIC offices in Leadenhall Street in 1801. Since its inauguration it had been collecting a broad range of material from British India, including 'natural and artificial productions' and particularly those plants 'whose produce is an article of commerce' (cited in Desmond 1982, 8). And in the sub-continent itself, the Indian Museum at Calcutta (now Kolkata) had come into being in 1814 largely as a result of the efforts of EIC botanist Nathaniel Wallich. It had likewise collected from inception 'dried fruit and plants; mineral or vegetable preparations peculiar to an eastern pharmacy; and implements of native art and manufacture', among other categories (Chakravati 2004, 2). Hooker and Wallich corresponded from 1818 to 1854 and exchanged specimens of useful plant species during that period.[40] It is worth noting, too, that John Forbes Royle, one of the quartet of botanists referred to by Archer in *Popular Economic Botany*, was an Anglo-Indian who began his career with the EIC as a surgeon. From 1823 to 1832 he was superintendent of the EIC's botanic garden at Saharanpur, then in 1837 he was appointed to the professorship of *materia medica* at King's College London, which he held till 1856. From 1838 onwards he also held the post of Reporter on the Products of India at East India House, in which capacity he reorganised and reinforced the economic botany collection at the India Museum, and in 1851 managed the Indian section of the Great Exhibition. Royle's economic botany trajectory, then, was another instance of 'imperial careering' – developing his ideas and practices 'trans-imperially' as he moved from one imperial site to another (Lambert & Lester 2006, 2).

[40] RBGK Archives, DC 52 f.46 to DC 55 f.470. Accessed 21 August 2012 from JSTOR Plant Science: http://plants.jstor.org/search?personName=wallich&st=397103&p=4&nh=20&s=grp

By contrast William Hooker's trajectory was largely shaped by his experiences within Britain. Jim Endersby has suggested that Hooker's interest in economic botany may have arisen during the twenty years he spent as a professor of botany at Glasgow, 'absorbing its industrial and commercial ethos' (Endersby 2008, 11). And from Joseph Hooker we learn that William had 'a large collection, formed chiefly for the use of his class in Glasgow' of vegetable products, 'raw and manufactured...and large fruits and other objects of varied interests' which he had brought with him to Kew (Hooker 1903, lxxvi).

Museums 1-4

> 'It is curious to see how rapidly interesting vegetable products are coming into our garden, now it is known we are to have a Museum'
>
> William Jackson Hooker 1846 [41]

In the summer of 1846 Hooker invited the Commissioners of Woods and Forests to inspect his collection of textiles, drugs, gums, dyes, and timbers which he had laid out on trestle tables in the building he had in mind for a museum (Desmond 2007, 184). This 'excellent brick structure' had previously been used partly as a foreman's cottage, and partly as a fruit store to the Hanoverian royal family before its transference to the Department of Woods and Forests by Queen Victoria earlier in 1846 (Hooker 1853, 329-30). Hooker's aim was to persuade the Commissioners of the value of a museum dedicated to the needs of scientific and commercial audiences. Permission was granted and architect Decimus Burton proceeded to prepare plans (Figures 1.4 and 1.5). Burton removed pre-existing partition walls, raised the height to the equivalent of two storeys, and opened up the central space to the roof. He incorporated a skylight and balcony into the structure, and to house the collections, he designed glazed table cases and wall cabinets (Figure 1.6).

[41] Letter from William Hooker to Turner 22 October 1846; RBGK Archives, WJH/2/10, f.67

To Hooker's own contributions were added a few specimens already belonging to Kew, as well as others given by Mr. John Smith, the Curator of the Gardens. John Stevens Henslow of Cambridge University, who advised and assisted Hooker in the arrangement of the museum, also donated 'various preparations of great interest and importance', and collectively these formed the founding collection (Hooker 1853, 334). The very existence of the Museum acted as a magnet for further acquisitions 'from all quarters' to the extent that the building was soon filled beyond its capacity and visitors circulated with difficulty. So in 1853 funding for a second museum building was applied for (Hooker 1853, 330). From the opening in 1857 of Museum No. 1, as it immediately became known, taxonomy was fully represented across the two Kew Museums with Museum 1 dedicated to dicotyledons and gymnosperms, and Museum 2 (the original Museum) to monocotyledons and cryptogams.[42] To walk through the Museums in the prescribed order was to perform Candolle's natural system, a system which was considered the successor to Jussieu's (Sivarajan 1991, 70).[43] Furthermore, Candolle had interests in economic botany, making his a particularly appropriate system to classify the collections and organise the displays.

In Museum No. 3 (Timbers), opened in 1863, Hooker opted to reflect the geographic principle employed in the 1862 London International Exhibition from which the majority of the exhibits were acquired. This catered better to the needs of the commercial visitor whose systematic botanical knowledge may have been slight and who was more interested in the geographical provenance

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[42] Dicotyledons: flowering plants, the seeds of which typically have two embryonic leaves or cotyledons
Monocotyledons: flowering plants, typically with one cotyledon or seed-leaf
Gymnosperms: a group of seed-bearing plants that includes conifers
Cryptogams: plants that reproduce by spores

[43] 'Museum' is used in the thesis to refer to the institution of the Museum of Economic Botany; 'Museums' is used when inferring the four separate spaces. Both were used thus in contemporary sources.

of particular species. Princess Augusta's orangery, designed by William Chambers and dating from 1761, was chosen for its dimensions to display the increased number of large timbers now in the Collection.[44] On the opening of Museum 4 (British Forestry) in 1910, the British specimens were separated off, leaving Museum 3 as a museum of colonial timbers. Museum 4 had its own, thematic layout which reflected the differing needs of forestry practitioners and scientists (for more detail on the architecture of the museum buildings see Chapter Four; for images of the Museums see Appendix I). Thus, by 1910, with four museums embodying three different display principles and catering to a number of discrete audiences, Kew had a museum complex: a single institution, the Museum of Economic Botany, comprehending a number of interconnected parts, or, to paraphrase Tony Bennett, a series of linked sites for the development and circulation of economic botany (Bennett 1995, 59).

Curators

Although Kew directors represent the most visible faces of the Kew Museum, its curators played crucial roles in organising and managing the institution. Although they make rare appearances in published narratives, traces of their contributions can be seen in museum records and in the collections, the development of which has reflected their varying interests and personalities. The handful of texts in the Kew historiography which refer to the Kew Museum (discussed more fully in Chapter Two) has tended to cast William Hooker in the role of its sole author (Brockway 1979, 83; Hastings 1989; Wickens 1990, 1993a; 1993b; Ponsonby 1998; Drayton 2000, 192-201; Griggs *et al*. 2000). Edward Alexander, who devoted a chapter to William Hooker in his rather tellingly entitled *Museum Masters*, refers to him somewhat biblically as the Museum's 'creator' (Alexander 1983, 126). In this thesis I aim to emphasise the collaborative nature of policy and practice in the Museum of Economic

[44] 'The building is 142 feet long, 30 feet wide, and 25 feet high' (RBGK 1927, 2)

Botany. As we have seen, even the founding collection was an aggregation of donations from William Hooker, John Stevens Henslow, and John Smith – the curator of the Gardens. Similarly, the first museum installation was the work of Hooker, Henslow, and Alexander Smith, son of John. In 1847 Alexander became the unofficial curator of the Kew Museum, remaining so until 1856 when he was awarded the title and post of Curator.[45]

An emphasis on practices has proved to be an excellent means of identifying curators' contributions. Similarly, through the use of object biographies (as described in Chapter Three), curators' positions in networks of knowledge and exchange can be made more visible. For example, Alexander Smith produced the first museum catalogue in 1855, and his manuscript is still to be found in the Kew archives.[46] Smith's successor as curator, John Reader Jackson, held the post for forty-three years. Like Smith, on taking up this office, he was not a university graduate or an acknowledged botanist, and his knowledge of economic botany was acquired 'by long and extended experience' (Jackson 1891, 122). It is interesting here to note that the Royal Commission of 1850 into the management of the British Museum (BM) defined a good curator, not primarily as a subject-specialist, but as presenting the qualities of 'patient research, constant attention to details, care in the compilation of catalogues, taste and skill in arrangement [and] capacity of administration' (cited in Alberti 2011, 54). By these standards Jackson was a curator of the first order. Furthermore, he became an authority on economic botany and wrote a number of books on the subject, of which perhaps the best-known is *Commercial Botany of the Nineteenth Century* (Jackson 1890). He also assisted in the revision of the *Official Guide to the Kew Museums* through four editions and was correspondingly acknowledged on the title page. He played a large part in the

[45] For images of curators see Appendix II

[46] RBGK Archives, QX 93-0002 Museum Records c. 1850-1980, Box 3, 'Museum of Economic Botany, Kew: Catalogue 1855'

identification of new plants and plant products submitted from growers and brokers, as is evidenced by the 'New Products' register he introduced, as well as by his considerable correspondence.[47] He managed his varied workload unaided for twenty-one years until in 1879 he was given an assistant, at which point his title was changed to Keeper of Museums (Wickens 1993b, 137). Jackson's successor as Keeper was his former assistant, John Masters Hillier, who joined the Museum from the Kew Observatory. He, too, was not a botanist, but had administrative skills (Wickens 1993a, 89) and similarly acquired economic-botanical knowledge in post, becoming a regular contributor to the *Bulletin of Miscellaneous Information*, Kew's journal of economic botany. And like Jackson, he gave lectures in economic botany to Kew's student gardeners (RBGK 1923, 203).

Only two museum curators at Kew came to the post as professional botanists: John Hutchinson (Keeper 1936-48), a taxonomic botanist of international renown, and Frank Howes (Keeper 1948-66), an economic botanist who had previously served in the Department of Agriculture of the Gold Coast (Wickens 1993a, 91). The lack of formal scientific training amongst pre-Hutchinson curators begs the question as to which tasks they were considered qualified to undertake. In his annual report for 1866, Joseph Hooker went some way towards answering this by introducing a further figure into the cast of museum actors. Daniel Oliver, Keeper of the Kew Library and Herbarium since 1864 (Figure 1.7), had recently been awarded the 'immediate control' of the Museums, Library, and Herbaria, and was charged with the naming of the collections in the Gardens and Museums (Hooker 1867, 2). In 1871, as witness to the Royal Commission on Scientific Instruction and the Advancement of Science,[48] Joseph Hooker explained that the scientific arrangement of the

[47] RBGK Archives, QX 93-0002, Box 3, 'New Products 1884-1916'

[48] Hereafter referred to as the 'Devonshire Commission'

Museums was the responsibility of himself and Oliver, whom he described as 'my principal scientific aid in the establishment'.[49] Whilst at that time Oliver received a salary of £400 per annum and a house, the curator, John Reader Jackson, earned only £150 per annum, which gives some indication of the premium paid for a salaried scientist in the years when curatorship was still trying to establish itself as a profession.[50] It is telling too that it was Oliver who authored the *Official Guide to the Kew Museums* through six editions from 1861 to 1875, although 'additions and corrections' were contributed by Jackson from the third edition onwards. Oliver maintained his scientific watch over the Museum until the reinstatement of the position of Assistant Director in 1875 with the appointment of Thiselton-Dyer,[51] and thereafter the assistant director assumed that responsibility.

Aside from their administrative, exhibitionary, pedagogical, and distributive duties, Kew Museum curators were actively involved in Kew's economic botany agenda. Curators received and answered enquiries from commodity brokers based in the chief ports of London, Liverpool, and Bristol. These enquiries often concerned the identification of unknown products received from overseas, 'and any information as to their properties, value, and the probability of the supply meeting the demand, should such arise' (Jackson 1891, 123). The first step was for the curator to cross-reference the specimen with those in the Museums, and if unsuccessful, forward it to the Herbarium for determination.[52] Beginning with Jackson, the curators began to take a more proactive role in this process, visiting regional centres such as Manchester,

[49] 1872 [C. 536], p. 435, ¶6664. *Royal Commission on Scientific Instruction and the Advancement of Science Vol. I First, Supplementary, and Second Reports, with Minutes of Evidence and Appendices*

[50] The Museums Association was established in 1889 principally for this purpose.

[51] Thiselton-Dyer always used the compound form of his name which acquired a hyphen c. 1890-91 (Desmond 2007, 427). For the purpose of the thesis, the hyphenated spelling will be adopted throughout.

[52] RBGK Archives, QX 93-0002, Box 3, 'New Products 1894'

Bristol, and Liverpool to consult with importers and gather specimens.[53] Kew was also asked frequently by the Colonial Office to analyse the quality of vegetable raw materials. In this instance, the line of enquiry would begin with the director and devolve upon the curator who would prepare a reply and send it back up the line to be dealt with as directors' correspondence. As Kew had no permanent plant anatomist in the Jodrell Laboratory until 1906, and no resident economic botanist until 1927, the usual procedure was for the curator to approach a medical practitioner or a London-based commercial laboratory such as Fergusson & Foster, or Ide & Christie (McCracken 1997, 86-87).

Access and audiences

Hooker envisaged his museum audience as 'not only the scientific botanist, but...the merchant, the manufacturer, the physician, the chemist, the druggist, the dyer, the carpenter and cabinet-maker, and artisans of every description' (Hooker 1855, 330). In this view, the museum's role was less to extend scientific knowledge to the masses in general than to address two discrete audiences – the scientific and the commercial – each with their own knowledge requirements. This was to prove problematic as the century progressed, not only for Kew but for other natural history museums (see Chapter Four). Apart from the scientist, the audience was configured by Hooker as artisan and entrepreneur. One detects here echoes of Matthew Arnold's 'Scotch skilled labourers and Scotch men of business' who must have been familiar figures to Hooker from his Glasgow days (Arnold 1867, cited in Yanni 1999, 92).

The illustration in the first museum guide of 1855 suggests the kind of visitors envisioned by Hooker and more particularly approved ways of seeing in the Museum (Figure 1.6). As Samuel Alberti argues, museum guide-books served

[53] See previous note; also numerous articles in the Kew *Bulletin* on new products e.g. Hillier 1907, 1908, 1913

to shape the visit, but beyond this 'to construct what a visitor is and does' (Alberti 2007, 376). Here are five male visitors in frock coats and top hats (one, on the left, has a walking-cane), all signifiers of the bourgeoisie. Three of them are accompanied by women, and this very much played into contemporary notions of women as 'culture's gentle handmaidens' (Bennett 1995, 29). Tony Bennett relates that women were actively encouraged to visit museums, but only if chaperoned.[54] Two of the men confidently point to exhibits while their partners look on. On the left is a young man dressed in a cap and what appears to be a pea-coat, presumably an artisan. He, too, is accompanied by a woman who is attired more plainly than the others in the image. As she gazes into the wall cabinets, he peers into one of the table-cases. But whilst museums may have privileged the sense of sight, other senses and behaviours were involved (Alberti 2007, 380-87). It is telling that in the image the visitors are conversing, and in doing so appropriating the displays for their own purposes (Fyfe & Lightman 2007, 4); and they are mobile, as they work their way through the plant kingdom according to Candolle. There were also opportunities for touching; certain unidentified species were displayed openly on tables to encourage knowledge exchange with visitors. And we must not forget the olfactory experience of visiting the Museum of Economic Botany. Even now, as I approach the door to the Economic Botany Collection (EBC) store in Kew's Sir Joseph Banks Building,[55] the scents of cloves, cinnamon, and essential plant oils waft through the door of the environmentally-controlled facility which is kept at a constant 14° centigrade. How much more fragrant, then, must have been a visit to the Kew Museum, with sun streaming in through the skylight, and the aroma of the wooden display cases mingling with that of the exhibits. This may have evoked thoughts of warehouses and emporia to Victorian visitors, creating associations between the Museum and the world of international trade. Or it may have encouraged exotic imaginaries

[54] See Eastlake 1869; Ruskin 1880

[55] Hereafter known as the 'Banks Building'

and 'tropical visions' (Driver & Martins 2005). At the heart of the illustrated scene lies the notion of the museum as a 'space of emulation' (Bennett 1995, 24). The commingling of the classes, Bennett relates, was central to liberal ideas of teaching the lower ranks appropriate public behaviour through the observation and internalization of middle-class behaviour.

Despite such measured targeting, the Museums were to prove a remarkably popular attraction. For the year 1857 William Hooker was able to report that: 'One has only to see the immense numbers of people, from the prince to the peasant, who visit these Collections...to appreciate the practical utility of these Museums' (Hooker 1858, 3). If William was pleasantly surprised by the presence of the working classes in the Museums, his son Joseph was more troubled. In his 1871 annual report, ever the scientist, he presented to his Commissioners a hierarchical taxonomy of visitors. The second class consisted of:

> The industrial class; i.e., persons in the middle and lower grades of life especially, who throng the plant houses and museums in search of general or special information. Amongst these, the mechanics and artisans are perhaps the most numerous, who, with their families, (on full days) crowd the museums to suffocation (Hooker 1872, 2).

One reason for the Museums' popularity was free entry to the Gardens and all its public facilities; this remained the case until 1916 when a modest 1d. admission charge was levied (Desmond 2007, 366). On his arrival at Kew in 1841 William Hooker had announced that the Gardens would now be open to the public from one to six o'clock, 'to all respectable individuals who ask admittance at the gate...without the ceremony of conductors'.[56] From 1853 opening was extended to Sundays at the instigation of the First Commissioner

[56] 1845 (280) *Kew Gardens. Copy of Report from Sir W. J. Hooker, on the Royal Botanic Gardens, and the proposed new Palm House at Kew*, p.4

of Works – Sir William Molesworth (Desmond 2007, 364), meaning that the public had Sunday access to the Kew Museums long before other national museums adopted Sunday opening in 1896.[57] Sunday became the busiest day at Kew for commercial visitors, as Joseph Hooker observed:

> On Sundays the trading class is the most numerous, and private carriages are, to a great extent, replaced by omnibuses...On Mondays the artisans come in great numbers, and so often in bodies of several hundreds, representing unions, charities, and other organisations, that this is, on an average, by far the fullest week-day. The omnibus on this day gives place to the van (Hooker 1872, 3).

During the 1870s a very public debate was conducted in parliament and in the media to extend Kew's opening hours to a full day, a motion fervently opposed by Joseph throughout his Kew career. Only in 1912, after his death, were the Gardens open from ten in the morning (Desmond 2007, 365). Resistance to the idea of the Museums serving the working-classes, however, lingered on.[58] Bean's 1908 book depicted a worker and his family relaxing by the river; visitors to the Museum, conversely, were shown as distinctly and purposefully middle-class (Figures 1.8 and 1.9). Of the worker, Bean wrote: 'botany in itself interests him probably not more than Greek, yet he admires the trees and lawns' (1908, 65).

[57] Further to a resolution in the House of Commons on 10 March 1896; 1896 [C.8190] *National Portrait Gallery. Thirty-Ninth Annual Report of the Trustees of the National Portrait Gallery*, p.13

[58] This was not unique to Kew; regional, municipal museums were subject to similar debates (Hill 2005, 125-142)

3. Conclusion: from knowledges to disciplines

This short history of economic botany as it developed from the mid-nineteenth century has discussed some of the terms central to this thesis: knowledge, field, science, discipline. It has equally sought to provide a frame of reference for the intellectual medium in which the Kew Museum was conceived and flourished – that of nineteenth-century botany. In situating the Museum of Economic Botany thus, it has made the case for the Museum as one of the earliest sites for the production of economic botany and for its construction as a discipline in the period under scrutiny. The brief account of the Museum's history and pre-history has reinforced this argument but has equally sought to reveal the collaborative nature of practice at the Kew Museum, and to reinstate those actors who have not been previously exposed on the published page. In so doing, the Museum has begun to emerge as a dispersed and mutable assemblage of people and things. The next chapter will consider the historiography of nineteenth-century economic botany, museums, and popular science, amongst which this thesis takes up its own position, drawing out the theoretical contexts which have informed and directed the research project.

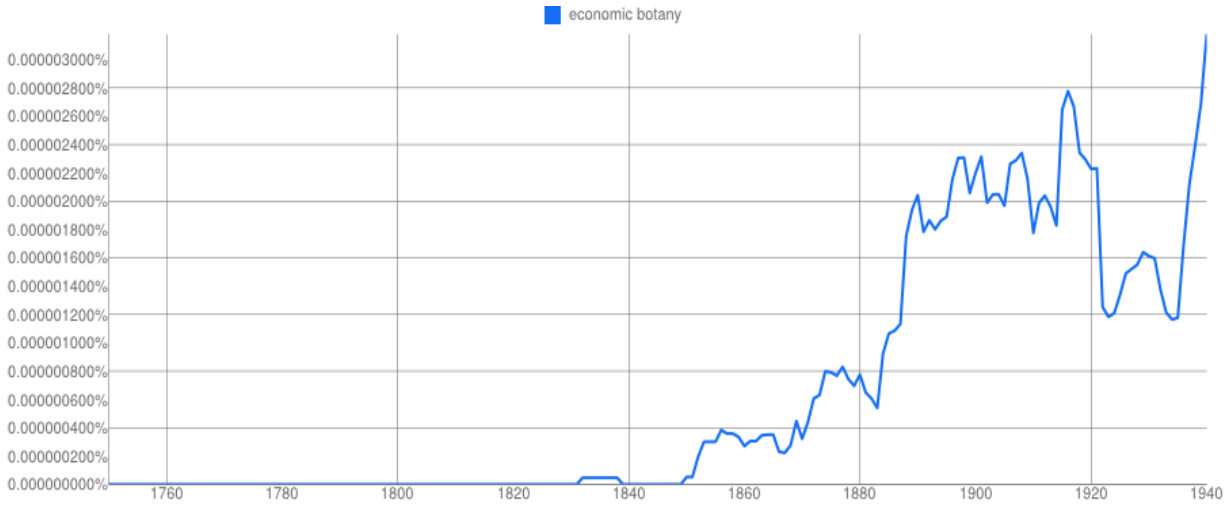


Figure 1.1 Occurrence of the term 'economic botany' in sources printed in the English language 1760-1940

Dataset generated from Google's corpus of scanned books, estimated at 4% of all books ever printed (Michel *et al.* 2011).

Source: Google Ngram Viewer; accessed 6 September 2012 at http://books.google.com/ngrams/info

Figure 1.2 'Exhibition of the Royal Botanic Society, Regent's Park'

Source: *Illustrated London News* 27 May 1854 ©2012 Gale

Figure 1.3 Museum of Practical Geology, Jermyn Street (n.d.)

Reproduced with the permission of the British Geological Survey ©NERC

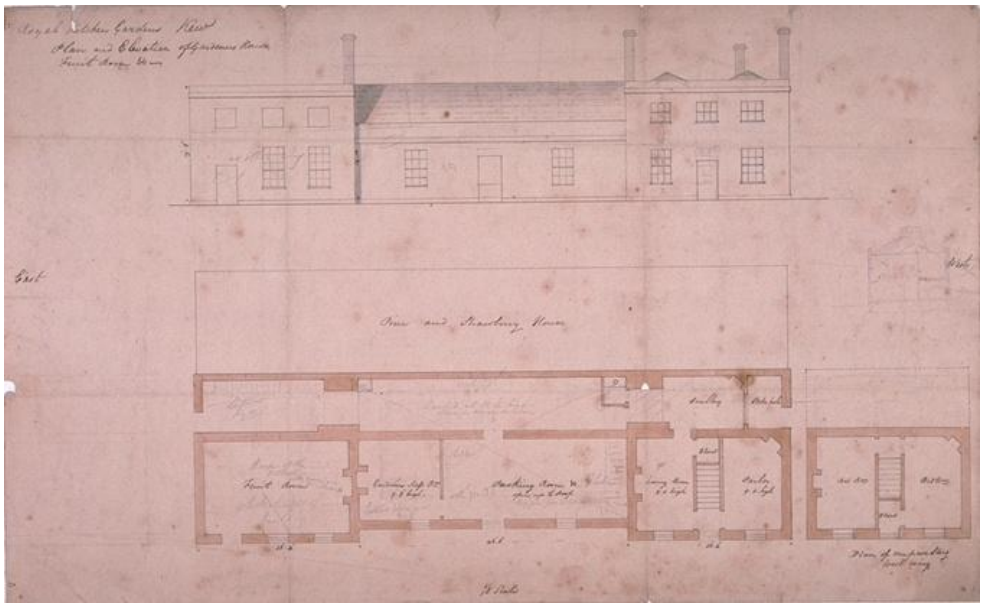


Figure 1.4 Decimus Burton's plans for the Museum of Economic Botany 1846: before conversion

KPI DD-2 ©RBG, Kew

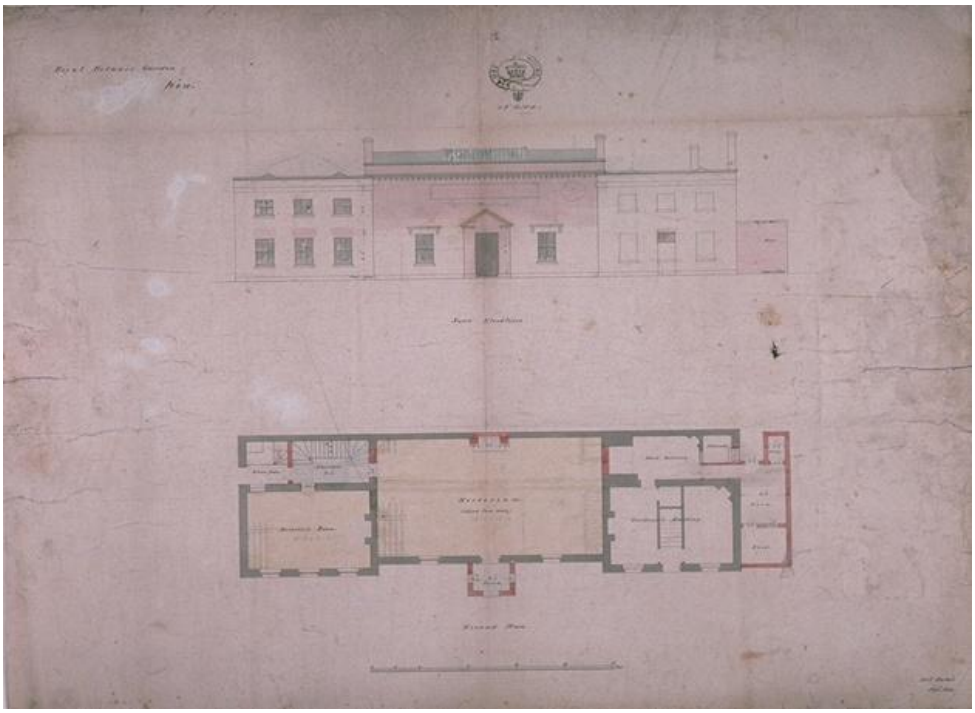


Figure 1.5 Decimus Burton's plans for the Museum of Economic Botany 1846: after conversion

KPI DD-3 ©RBG, Kew

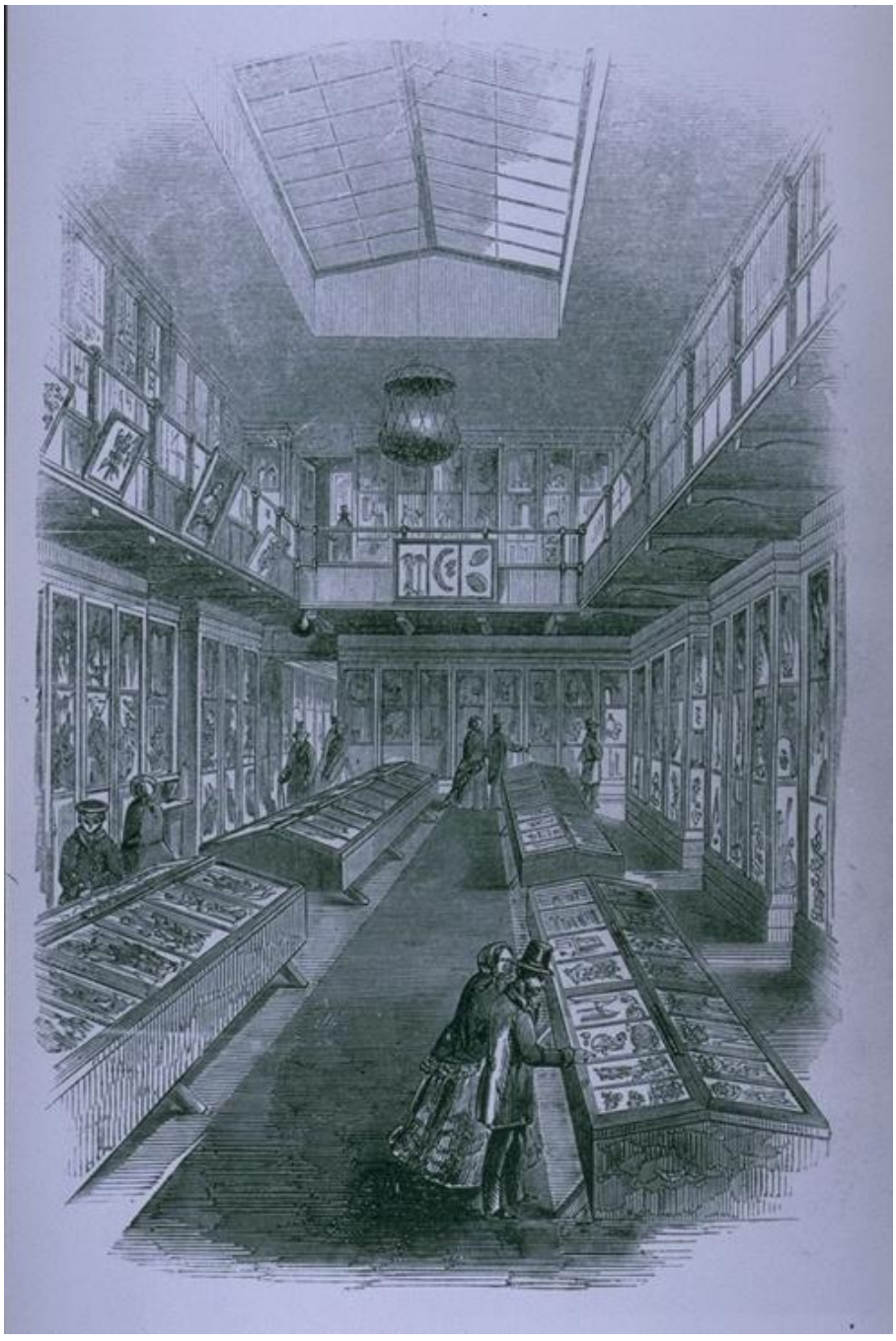


Figure 1.6 The Museum of Economic Botany 1855

KPI NN-82-4 ©RBG, Kew

Figure 1.7 Daniel Oliver, Keeper of Kew Herbarium and Library 1864-90 c.1863

Figure 1.8 'The Thames and Sion Park as seen from Kew Gardens' 1908

Figure 1.9 'The Pond and Museum' 1908

Source: Bean 1908

CHAPTER TWO

Science, Empire, and the Museum

From far away over the sea,
From Russia, Japan and Chili,
From every direction there be
Came polished wood, roots, sap and skin,
Every country seems to compete
By sending all kinds thick and thin
To make the museum complete.

Cornish *The Poetical Guide to the Royal Gardens, Kew* 1907

This chapter provides an account of the key concepts and ideas which have informed the thesis, reviewing relevant literature on science, empire and the museum. The first section considers the literature on Kew and economic botany, from the perspective of Kew 'insiders' as well as those writing at a critical distance. It is worth noting that the published literature on the Museum of Economic Botany from either camp can be best described as scant. The second section considers the scholarship on the production of knowledge in and by museums. Since this thesis stands at the junction of a number of disciplines – to wit: historical geography, imperial history, history of science, and museum history – I examine first the contribution made by museologists to the debate, and then trace the historiography of spatial accounts of museums by historians and geographers of science. Finally, the third section is a review of the literature on museums and public science, covering the functions

envisaged for the nineteenth-century public museum, the forms in which science was 'packaged' for a popular audience, and the ways in which that audience appropriated the knowledge displayed in museums to their own ends.

1. Histories of Kew and economic botany

> In the industrial development of British colonies and possessions, the Kew man has always been among the earliest workers. As soon as the *pax Britannica* has been established, and often before, he appears.
>
> Bean 1908, 68

For William Hooker, the field of economic botany was defined by its concern with 'the practical uses and applications of the study of Botany, and the services thus rendered to mankind' (Hooker 1855, 4), expressing a sense of universal benefit which has elsewhere been described as the rhetoric of 'improvement' (Drayton 2000). This rhetoric permeates accounts of Kew written by 'insiders' – those who have worked there, and who have to varying degrees absorbed and cultivated its improving ethos.

Insider histories

In 1763 William Chambers, architect of the royal estate at Kew, made reference to the physic garden established at Kew by Princess Augusta in 1759. The garden was then far from complete, but 'from the great botanical learning of him who is the principal manager,[1] and the assiduity with which all curious productions are collected from every part of the globe, without any regard to expense, it may be concluded that in a few years, this will be the amplest and best collection of curious plants in Europe' (Chambers 1763). It now appears as a prophetic statement and is certainly one of the earliest-known linking Kew to

[1] Presumably Lord Bute, botanical advisor to Princess Augusta

the science of useful plants. Since 1840, when Kew became an institution of state, there has been a robust tradition of Kew writing its own history, and indeed, of displaying that history in its Museums. In Museum No. 1 William Hooker began the collection and display of portraits of 'eminent botanists and travellers' (Oliver 1868, 60) which created a botanical pantheon in which Kew scientists featured as the natural successors to a long line of botanical 'greats'. And in the 1886 guide to Museum No. 3, it was reported that there could be seen there 'a large series of views in the Royal Gardens, Kew, also photographic and other views in the several Botanic Gardens of Europe and Asia' (RBGK 1886, 68-69); in the centre of the building was 'a large and important collection of plans, prints, drawings, photographs, &c., illustrating the history and development of the Royal Gardens, Kew' (RBGK 1893, 83) (Figure 2.1). Such displays, by their longitudinal and latitudinal representations, invested Kew with the authority of history and geography respectively, and resurrected the notion, from the Banksian era, of the Royal Botanic Gardens as the centre of a botanical empire.

In 1891, to mark the fiftieth anniversary of Kew as a national institution, director Thiselton-Dyer wrote an historical account of the Gardens for the *Bulletin of Miscellaneous Information.* As he readily admitted, prior to 1840 records were scarce, and he had to rely on 'local tradition, on local histories, the statements in which are often confusing and inaccurate, and on such scattered notices as could be gathered from contemporary literature' (Thiselton-Dyer 1891, 279). Those sources included local residents, amateur botanists, and former members of staff. Many of the anecdotes which appear in later histories of Kew can be traced to this handful of sources. Thiselton-Dyer's article stopped at 1840 and he planned a sequel which never came to fruition but he encouraged the Assistant Curator of the Gardens, W. J. Bean, to write the first full-scale history (Desmond 2007, 442). That book, published in 1908, is as interesting for Thiselton-Dyer's introduction as it is for Bean's historical

narrative. The Director described the contemporary constitution of Kew as 'the outcome of an almost inevitable evolution', thus setting a providential tone which permeated much of the subsequent Kew literature. From this perspective, Kew had 'no politics or any aim but to accomplish useful work'. Thiselton-Dyer situated the commencement of this work in 1759, when Princess Augusta founded her botanic garden at Kew. Kew's economic botany mission continued under Joseph Banks who made Kew 'the depot for the interchange of plants with the Colonies'. There is a similarly inevitable tone to Thiselton-Dyer's account of public Kew which, 'phoenix-like, rose again from its ashes' in 1840 to recommence its mission of compiling a botanical survey of the Empire (Bean 1908 xiv-xviii).

Bean expanded on this history in a similar vein. Under Banks, plant collectors had been commissioned to enable the creation of both living and dried plant collections at Kew, and this was a practice which was resumed by Hooker. Bean continued: 'One of the most important functions of Kew, ever since 1841, and, to some extent, previously – has been to help in the development of the British Colonies, both new and old, by fostering industries connected with plant-life' (Bean 1908, 60). But how did this work in practice, and what was the role of the Museums in the project? Bean explained the practice of the propagation of useful plants at Kew from specimens received from around the world, and the subsequent distribution of cultivars to 'those British Colonies and Possessions in which they are most likely to succeed'. And this was inflected with a sense of geographical inevitability, for it was Britain, from her 'central position, on which all the great trade routes converge', which afforded a 'convenient halfway house' from which Kew could conduct this work (Bean 1908, 169). The fruits of these labours were displayed in the Kew Museums; they showed, claimed Bean, the uses of plants 'to mankind' (Bean 1908, 125), echoing William Hooker's vision of economic botany as a form of universal humanitarianism.

It would be over fifty years before a history of comparable weight from a Kew insider was published. William Turrill's book offered a bicentennial perspective of Kew in 'the age of metals, of machinery, and of atomic energy' (Turrill 1959, 62) when it might have appeared that the role for economic plant science had greatly diminished. Turrill's study began where Bean left off; indeed, Thiselton-Dyer's 1891 article and Bean's 1908 book were his foundational texts, onto which he built an updated narrative, largely by reference to anecdotal sources, Kew's *Bulletin,* and the *Journal of the Kew Guild*. Still, then, there was little in the way of systematic archival research. Turrill, a former keeper of the Kew Herbarium and Library, presented a surprisingly optimistic view of the post-war, post-empire, post-Ashby era in which economic botany was definitely in the present tense.[2] Kew Gardens had acquired a plant quarantine house in 1927 funded by the Empire Marketing Board, and another in 1951 from a Colonial Development and Welfare grant, and appeared to have found a new raison d'être as 'quarantine centre for the Commonwealth' (Turrill 1959, 88-89). It may have been this new function which inflected his account of the Museums with a keen sense of modernity. In reality there had been a dramatic decline in museum collecting activities observable from 1939 (Figure 3.7) and two of the Museums were closed in 1959 – the same year as Turrill's book was published.[3]

By the time Ray Desmond's work appeared in 1995, there was an identifiable need for an updated Kew history with a greater emphasis on archival sources and, as former Chief Librarian and Archivist at Kew, Desmond had an unrivalled knowledge of Kew's archives. Again, it is the director's foreword which is almost as telling as the opus which follows, and Ghilean Prance here

[2] *Report of a Visiting Group to the Royal Botanic Gardens, Kew (Chairman: Sir Eric Ashby) [in March 1957]* Great Britain, Ministry of Agriculture, Fisheries and Food [MAFF] 1958 was especially critical of Kew's Museums.

[3] 'Considerable changes in the allocation and lay-out of the Kew Museums are planned, and some are already in process of being carried out' (Turrill 1959, 86) is the only reference to the flux that was being experienced in the museums at the time of publication.

set a Whiggish tone: Kew's history was presented as essentially that of 'the progressing of a most dynamic institution' (Desmond 1995, ix), and its staff as having made Kew 'what it is today'. Desmond situated the zenith of Kew's involvement in imperial botany in the period spanning the directorship of Thiselton-Dyer from 1885 to 1905. Under Thiselton-Dyer's aegis, the Colonial, Foreign, and India Offices were heavily dependent on Kew's expertise, a situation which was recognised in 1902 when Thiselton-Dyer was appointed as botanical advisor to the Secretary of State for the Colonies. However this position was not to last; Kew's botanical authority over the colonies was to be significantly weakened by the advent of the Imperial Institute in 1887 and by subsequent developments in both metropole and colony.

Desmond's book displays that quality of partiality towards Kew common to all insider histories. However, he is keen to demonstrate that Kew's 'evolution' from two royal estates to 'the world's premier botanic garden' was neither smooth nor uneventful (Desmond 1995, xvi) and as the most complete chronicle of Kew to date, the book has been an invaluable source for this thesis.[4] Desmond's history was more than the latest addition to the field of insider literature on Kew. It was also a reaction to new studies of Kew and empire – critical histories by academic researchers outside Kew – which had begun to appear from the late 1970s.

Critical histories

In 1979, a former student of the City University of New York, Lucile Brockway, published her doctoral thesis under the title *Science and Colonial Expansion: The Role of the British Royal Botanic Gardens* (Brockway 1979). Brockway's slim volume was the first of a series of critical reviews of Kew's involvement in economic botany and in particular of the asymmetrical nature of colonial

[4] Generally it is the revised edition (2007) which is cited.

exchanges during the *Pax Britannica*. Whilst Thiselton-Dyer had claimed that Kew 'gave' cinchona to India (Bean 1908, xviii), Brockway presented an image of metropolitan enrichment at the expense of peripheral 'immiserization' (Brockway 1979, 23). Her 'historical-anthropological' approach (Brockway 1979, 6), informed by Immanuel Wallerstein's neo-Marxist world-systems theory, envisaged global society as a set of mechanisms designed to transfer resources from periphery to core (Wallerstein 1974; 1979; 1980). On this foundation Brockway developed the concept of 'energy flow' (Brockway 1979, 8) – human energy in the form of 'underpaid' labour and plant energy extracted by imperial centres. She did so from the viewpoint of human ecology, awarding equal agency to natural resources and to those human institutions involved in their use and distribution, and in this sense, Brockway scored another 'first' – that of considering Kew's circulatory networks as co-constituted by objects and people.

Brockway related the often coercive and covert means, in which the Royal Botanical Gardens and the Royal Geographical Society were directly implicated, by which seeds and seedlings were smuggled out of South America and propagated, first at Kew and colonial botanical gardens, and then on commercial plantations in British India, Ceylon, and Malaya. It is useful to compare her account of this process with that of an insider. According to Bean, the increasing demand for rubber and its inaccessibility 'made it important to create fresh sources' and so, in 1875, 'a consignment of 70,000 [rubber] seeds was received at Kew' (Bean 1908, 170), implying a passivity on Kew's part which stretches credulity. In contrast, Brockway focused on the undercutting of rubber prices by British plantation owners, and the subsequent 'collapse' of the Brazilian industry; and on the de-skilling of colonial labour which transformed artisans producing finished goods into plantation workers engaged in the supply of raw materials to British industry. What had fuelled this 'unequal exchange' (Brockway 1979, 20) was twofold: a combination of the final

abolition of slave labour in British dominions in 1833, creating a need to source alternative forms of cheap labour; and increasing industrialization at home, requiring plant raw materials.

In tracing the rise of Kew during the nineteenth century, Brockway developed two themes in particular: the close connection between imperial expansion and government support for science; and the 'organization and exercise of power by the small group of like-minded scientists who made up the Kew circle and who had supporters in high places' (Brockway 1979, 78). There is however, an implication of inevitability in her narrative which ignores the precarious nature of Kew's fortunes under its first three directors, and which undervalues their tireless lobbying of royalty, aristocracy, and government departments such as the Colonial Office, India Office, and Admiralty. Brockway made only brief reference to the Museum of Economic Botany in its role as a reference collection for scientists and manufacturers but she did draw attention to the origin of its collections in voyages of exploration which were frequently followed by political annexation and commercial development.

Perhaps unsurprisingly, Brockway's work is not held in high esteem at Kew; Desmond alleges that she 'fails to substantiate her polemic with archival evidence' (Desmond 2007, 442), and her bibliography is generally felt to be too narrow in scope. Nor have a number of textual inaccuracies helped her case. Her argument, as Desmond implies, was doggedly one-sided; in her rubber case history, for example, she did not consider the immense cruelty visited on Amerindians by Brazilian rubber barons. Nevertheless *Science and Colonial Expansion* was a seminal work in the literature on Kew and empire, and without its critical gaze, it is hard to imagine the scholarship on Kew which was to follow.

In contrast to Brockway, Richard Drayton's study of the relationship between science and imperial expansion emphasized the two-way process of colonisation – 'human communities once separated by distance and culture, [brought] into systems of exchange and interdependence' (Drayton 2000, xiv). Drayton's argument – that Britain was formed by its empire as it formed that same empire, or in other words, that imperialism had as great an effect on the dominant society as it did on subordinates – was a view of imperial history which had emerged in the 1980s in the work of historians such as John MacKenzie (MacKenzie 1985; 1986; 1990; 1992) and Catherine Hall (Hall 2000; 2002). According to Drayton, whilst the history of botany could be traced back to the ancients, it was in late eighteenth-century Europe that the notion of 'improvement' emerged as a supporting orthodoxy for botanical research and processes of colonisation. Those who understood nature best were, *de facto*, best-suited to administer territories and their human and natural resources. This utilitarian world-view perceived the combination of European power and scientific knowledge as offering the potent promise of conferring 'the greatest good on the greatest number'. If this ideology inflected science and political economy in the eighteenth century, it was over the course of the nineteenth century that it was appropriated for administrative purposes. Kew Gardens, Drayton suggests, could be viewed as a prime example of this convergence of the interests of administrators and naturalists.

Drayton is one of only a few critical historians who have seriously considered the role of the Kew Museum in the imperial project. He argued that by requesting a museum before a herbarium, Hooker had tacitly acknowledged that it was still too early to seek funding for scientific research at Kew; instead Hooker emphasised an economic purpose for the gardens. The pace of industrialization was rapid in the 1840s, and before the advent of synthetic raw materials, Britain was faced with 'industry's utter dependence on plants and agricultural labour' (Drayton 2000, 194). So by applying for a museum of

economic botany, Hooker had 'trimmed his sail to catch a prevailing wind, rather than [acting] as a supremo, organizing the economic botany of the empire' (Drayton 2000, 196). The prevailing wind did not blow only in the direction of botanists and politicians, as Drayton relates:

> Machines did not merely run on coal, they consumed cotton, wool, dyes, and vegetable oils, and the strength of the peripheral populations which provided these…There was, in short, a concern with economic botany across the British Empire (Drayton 2000, 194-5).

Economic botany, then, was a subject of intense general interest in the mid-nineteenth century – as demonstrated by the *Household Words* article of 1856 cited in the prologue to this thesis – and therefore a potent one on which to found a new metropolitan museum. In the context of natural theology which informed much natural history discourse of the 1840s, the Museum of Economic Botany offered 'a portrait of Providence' and acted as 'a theatre in which visitors might discover their nation's place and purpose, at the centre of the world' (Drayton 2000, 196). Drayton argued that the Museum demonstrated the utility of Kew to the nation as much as it did the utility of imperial raw materials and labour. In this respect it served Hooker's own interests more directly than those of manufacturers. But this suggests that the Museum had merely an exhibitionary function – to display and thus make known the diversity of plant materials and their applications. In fact it was engaged in other forms of 'museological science' (Pickstone 1994) which involved direct collaboration with the manufacturing sector to the mutual benefit of commerce and Kew.

The forms of science, or more specifically, the material forms by which scientific knowledge was produced, have been a concern of historians of science since the 1970s (Shapin 1974; 1975). From the late 1980s, particularly in the work of Bruno Latour and Michel Callon, this work took a sociological turn.

'Actor-network theory' (ANT), as it was subsequently dubbed, considered the production of scientific knowledge via networks composed of human and non-human actors. These networks converged on particular institutions and individuals which in turn drew on the knowledge accumulated there to become 'centres of calculation' (Latour 1987, 215-257). Whilst the merits or otherwise of the 'centre of calculation' concept – in particular as it might apply to the Kew Museum – are dealt with in Chapter Six, I introduce it here because in a highly influential 1996 paper, historian David Miller was to recast Kew under Joseph Banks as a centre of calculation (Miller 1996). Miller's broader contribution to the history of Kew and empire lay in his notion of the 'Banksian empire': a powerful network of knowledge and influence with Banks at its centre, consisting of institutions and individuals – including the Royal Society, George III, and the Admiralty – with a shared ideology of practical scientific improvement and a mercantilist vision of empire. Such a network enabled the circulation of specimens from distant territories to Banks's metropolitan cabinet for evaluation, and thence to British colonies for cultivation. It was a notion which first saw light in Miller's doctoral thesis and thereafter in a number of published articles (Miller 1981a; 1981b; 1989) and marked a new phase in the historiography of Kew and empire.[5]

The most significant recent contribution to this literature is Jim Endersby's *Imperial Nature* (2008), an in-depth examination of the practices used by Joseph Hooker to sustain networks with colonial collectors. The practices under scrutiny – travelling, field collecting, corresponding, seeing, classifying, settling, publishing, charting, associating, and governing – encompass those involved in building, at a distance from the field, a metropolitan collection. The first four sets of practices relate to Joseph Hooker's relations with his colonial collectors and his attempts to control what was collected and how it was

[5] See also Mackay 1996; Frost 1996; Lawrence 1996; Gascoigne 1996

presented. The last six pertain to Hooker's project of classifying the plant kingdom from the Kew Herbarium.

Endersby's practice-based method has its origins in a cultural approach to the history of science that was developed at Cambridge in the 1990s. Cultural history views practice as one of the means by which people 'constitute and maintain their social existences' (Jardine *et al.* 1996, 8). *Cultures of Natural History* (Jardine *et al.* 1996), therefore, was practice writ large. Here, in this edited collection, it was practices – the 'conventions, skills and strategies' through which knowledge claims have been 'promoted, secured, and defended' – which linked people, objects, institutions, collections, and finances in order to produce natural history. By focussing explicitly on practices, Endersby's aim is to avoid making a distinction between the public and private spheres, one which he considers 'unhelpful' in the study of mid-nineteenth-century science (Endersby 2008, 315). The study of practices enables him to achieve a synthesis of the apparently esoteric, such as the geographical distribution of plants, and the mundane business of having to earn a living. A practice-based methodology also reveals how Joseph Hooker's thinking was shaped by a range of spatial issues from the preparation of specimens in the field to space constraints in the herbarium. Furthermore, practices as examined by Endersby reveal the need to convince the colony as well as the metropolis. Thus Endersby rejects the centre-periphery model implicit in Latour in favour of a more diffuse paradigm – a 'complex web of interdependence and mutual benefit' (2008, 3). The exchange of specimens and gifts between Joseph Hooker and his collectors resulted from processes of negotiation which constantly called into question the loci of centre and periphery (2008, 315).

Endersby's argument is that colonial collectors – British subjects resident in overseas colonies – were 'active participants in the making of scientific knowledge' (Endersby 2008, 17). Joseph Hooker's relationship with them was

subject to continual renegotiation, part of which was concerned with who had the right to name and classify species. Hooker, from his metropolitan herbarium, had to motivate collectors with gifts in the form of books and microscopes, yet such gifts were also sources of knowledge which might easily destabilize power relations between cabinet and colony (2008, 79). In the midst of this, however there prevailed the 'affective dimension' of science – the friendships that were forged through botany and revealed in correspondence. It was through such friendships that many networks survived despite frequent tensions. Colonial residents were not passive recipients of metropolitan scientific knowledge; rather, 'each side bartered its assets according to its interests and in the process defined who was central or peripheral and why' (2008, 110).

2. The museum as a site of knowledge production

> The most precious gifts of Nature, shown both in their rude condition, and as adapted to his uses by the ingenuity of man, cannot fail, when thus combined, to prove of great and telling importance, fraught with instruction and appealing forcibly to the eye and the understanding.
>
> William Jackson Hooker 1858, 3

'Knowledge is now well understood as the commodity that museums offer' announced Eilean Hooper-Greenhill in 1992 at a time when the social role of museums was newly under government scrutiny, and when education was once more being offered as museums' primary justification (Hooper-Greenhill 1992). But what does knowledge mean in a museum context? What is the role of the visitor and curator? And what of the relationship between space, time, subject, and object? To seek answers to these questions, Hooper-Greenhill's epistemological study turned to the rationality of museums past and present. Eschewing traditional notions of history as a developmental flow from past to present, Hooper-Greenhill appropriated Foucault's concept of effective history

to highlight the differences between periodic knowledge regimes. Foucault's mechanism for analysing the history of knowledge was the episteme – 'the unconscious but positive and productive set of relations within which knowledge is produced and rationally defined' (Hooper-Greenhill 1992, 12), and Hooper-Greenhill took *The Order of Things* as her start-point to analyse the epistemological history of knowledge in museums. She mapped Foucault's three epistemes – the Renaissance, the classical, and the modern – onto museum types, from the Renaissance *studiolo*, through the taxonomic Enlightenment collection, to the nineteenth-century public museum. Such a perspective has yielded insights at the epistemological level, but also has significant drawbacks, especially as a framework for historical interpretation. The matrix of Renaissance, classical, and modern does not always fit the history of museum display and does not readily accommodate the notion of reception. The evidence in the Kew case points less to a series of ruptures than to a recurrent deposition of concepts and practices created by successive changes of management, governance, and scientific orientation.

The Birth of the Museum (Bennett 1995), another influential museological text, was similarly set on Foucauldian foundations. In this case *Discipline and Punish* informed Tony Bennett's notion of self-regulation which he extended to the nineteenth-century museum, looking especially at the relationship between architecture, display, and the production of knowledge. Three themes in particular were advanced. First was the juxtaposition of natural history specimens and cultural artefacts in museums of natural history and anthropology. Bennett is one among many writers (Bal 1992; Coombes 1994; Haraway 1985; Karp and Lavine 1991; Gosden and Larson 2007; Alberti 2009) to have emphasised this juxtaposition. In the tendency to view history as an uninterrupted line of progress, culminating in 'the contemporary triumphs of industrial capitalism' (Bennett 1995, 77), argued Bennett, 'primitive' peoples were depicted at an earlier stage of development, representing 'the point of

transition between nature and culture…the point at which human history emerges from nature but has not properly begun its course' (Bennett 1995, 78-9). Secondly, he observed the planning of museum space in order to regulate the performative aspect of the museum visit. Messages concerning evolution or other 'big ideas' could thus be embodied in the form of a directed itinerary. Thirdly was his notion of the museum as a disciplinary mechanism by which the public regulated itself through mutual observation, and as a 'space of emulation' (Bennett 1995, 100).

The *Birth of the Museum* remains an influential work amongst museum historians, in particular its notion of the 'exhibitionary complex' – of museums, dioramas and panoramas, national and international exhibitions, arcades, and department stores as a series of 'linked sites for the development and circulation of new disciplines... and their discursive formations' (Bennett 1995, 59). That there were networks of exchange between such institutions is borne out by the movements of objects between the Museum of Economic Botany and exhibitions, department stores, and other museums. Like semiotic readings of the museum (Duncan 1991, Bal 1992), Bennett's approach relied on 'decoding' apparently embedded messages, and exemplified a method of interpreting museum practices which focused on the transmission of a message rather than its reception. Carla Yanni was amongst the first to critique Bennett on these grounds (Yanni 1999).[6] Rejecting the notion of epistemic change as rupture, Yanni claimed that museums representing one single master-narrative were rare; elements of former narratives lived on in the museum and co-existed with subsequent ones. Museums, therefore, resisted Foucauldian analysis. Visitors were never merely 'empty vessels' waiting to be filled with ideology (Yanni 1999, 8) but active participants in a constructive process of meaning-making. In short, 'the architecture of museums can only *suggest* a particular view: it

[6] Forgan 1994 predates Bennett and takes a more spatial approach; see also Kriegel 2006, 2007

cannot determine meaning, and it cannot separate people from their beliefs' (1999, 11).

Stephanie Moser, in her account of the Egyptian displays at the British Museum (BM), has more recently expressed a similar sentiment: that museum displays do not merely transmit knowledge but create it in conjunction with the viewer (Moser 2006, 2). Moser proposed a methodology for analysing knowledge production in the museum through the examination of three key practices: acquisition, display, and reception. By investigating the conditions of an object's acquisition, its relationship to the state of knowledge on the subject at that time, and the interests of various stakeholders, it becomes possible to see how particular fields of knowledge have been constructed in museums and how particular narratives have been created for objects. By looking at the space allocated to a display, its location within the museum, the spatial distribution and juxtaposition of objects, interpretative devices, and the effect of architecture, Moser isolated the factors influencing the viewer's production of meaning.[7] And by considering the range of visitors, their conditions of access, and the scholarly contexts in which they viewed, she accounted for a range of meanings attributed to objects, and for how museum displays have shaped people's understanding of ancient cultures and other subjects. Moser's aim was to define conventions of knowledge construction in museum exhibition (see also Moser 2010), and to demonstrate how museums have been central to the establishment of particular disciplines. It was by exhibiting collections of Egyptian antiquities in particular ways that the BM defined the culture of ancient Egypt, long before this became a subject of university research. Through the medium of its displays, it established interpretative frameworks that served to structure subsequent study.

[7] See also Hill 2005, 8

Methodologically, in its attendance on the key stages of acquisition, exhibition, and reception in the life cycle of a museum object, Moser's work called on the concept of 'object biography' methodology: 'Objects are now recognized as having their own complex "histories", their original creation and function constituting only one chapter in a trajectory of existence that includes subsequent reuse, discovery, presentation, and interpretation' (Moser 2006, 6). The notion of an object having a 'social life' emerged in the mid 1980s in the works of anthropologists such as Arjun Appadurai and Igor Kopytoff (Appadurai 1986; Kopytoff 1986). Appadurai, interested in the relationship between value and exchange, prescribed a new emphasis on the movements of objects in order to reveal the politics of human interactions.[8]

The idea opened up new possibilities for museologists, many of whom, like Moser, came from anthropological or archaeological backgrounds. Object biography has proved a useful tool in accounting for the interrelatedness of human and object agency in ways which de-centre the museum or the museum director from the narrative, thus avoiding the traps of 'parochial antiquarianism' on the one hand (Secord 2004, 659) and hagiography on the other. Similarly, object biography has given rise to new considerations of reception and meaning-making. In their exploration of the multiple meanings attributed to objects in the Pitt Rivers collection, Chris Gosden and Yvonne Marshall proposed a consideration of material objects at the stages of production, exchange and consumption, setting each of these within its social 'contexts and consequences', for 'the present significance of an object derives from the persons and events to which it is connected' (Gosden & Marshall 1999, 169-170). Furthermore, historical geographers of collections have shown that meaning is not fixed once the object enters the museum. Jude Hill, for example, has demonstrated how objects from the Henry Wellcome Collection accrued differing meanings in varying display contexts, in handling collections,

[8] Object biography, as it is applied to this thesis, is discussed in Chapter Three

and in storage, thus demonstrating the effect of space and place in the interpretative process (Hill 2004, 2006).[9] The notion that 'space matters' (Livingstone 2003, 5) to the production of scientific knowledge in museums is rooted, however, in a different tradition, one which we explore next.

Histories and geographies of science

Against the formerly prevalent view of science as a placeless and hence universally-understood phenomenon, historians of science have in recent years begun to consider scientific endeavour as a geographical concern. From the mid-1980s this geographical sensibility led to deeper probing into the role played by space in the production of scientific knowledge, into how space helps stabilise claims to scientific credibility, and into how scientific knowledge circulates (Shapin 1998, 6). In 1994 the BSHS conference at Kent University, entitled 'Making space: territorial themes in the history of science', brought together a range of historians from various disciplines – Anne Secord, Simon Schaffer, Iwan Morus, and Thomas Gieryn to name a few – and marked a key moment in the emergent identity of the new, spatialised turn in histories and geographies of science (Driver 1994).

It was in the 1990s that historical geographers began to take greater heed of this spatial orientation (Livingstone 1995) and since then geographers have produced a series of studies considering science as a 'social construction' (Thrift *et al.* 1995) or a 'cultural formation, embedded in wider networks of social relations and political power, and shaped by the local environments in which its practitioners carry out their tasks' (Naylor 2005, 2).[10] Livingstone's *Putting Science in its Place* (2003) was in effect a crystallisation of thinking on the

[9] See also Alberti 2009

[10] For example Naylor 2002, 2010; Hill 2004, 2006, 2007; Parry 2004

subject as it had come to be understood by historical geographers in the early twenty-first century.

'Issues of space,' argued Livingstone, 'are at the heart of scientific endeavour' (Livingstone 2003, 5). Space, however, is not a neutral container; it both enables and constrains social relations and hence the production of scientific knowledge within it. Nor are spaces stable or static – they are mobile and mutable, and so too, is the knowledge which is produced in them. Furthermore as ideas circulate, they are subject to translation and transformation in different spaces of encounter and thus it can be seen that reception too is both temporally and spatially situated. The 'venues of science' are in reality, then, 'spaces of discursive exchange', where knowledges are produced through processes of participation and negotiation. And furthermore, there are typologies of space; Livingstone therefore considers the spatial effect at the level of site, region, and circulation.

'Site' (2003, 17-86) includes the laboratories, museums, archives and field spaces which can restrain or promote particular interactions, where entry may be controlled along lines of gender, class, and ethnicity, and where students first learn their discipline and scientific rules are first established. The spaces of scientific activity 'conditioned the cognitive shape of the science produced' (Livingstone 2003, 37). But museums, argues Livingstone, perform a theatrical function via their displays as well as the scientific function of ordering the natural world. Nineteenth-century public museums were about knowing, but also about *making known* through the spatial distribution of objects. They chronicled collecting at its peak during the imperial era, and their displays can be seen as embodied ideas relating to scientific theories (evolution, stratigraphy or taxonomy) or to meta-narratives of empire and improvement. The museum may be considered as 'a map of its curators' claims to knowledge' (Livingstone 2003, 33) but visitors have never been passive reflectors of

curators' ideological standpoints; indeed, museums were often sites of struggle between curators, academics, sponsors, and the general public. 'Region' (Livingstone 2003, 87-134) concerns the way regional difference characterises and shapes thought. It is not only external to scientific investigation – the place where it happens – but internal, affecting how and why science is conducted there, and how the knowledge produced is appropriated and understood. Finally, 'circulation' (Livingstone 2003, 135-178) considers the movement of scientific knowledge via specimens, instruments, texts, and people. These, however, do not diffuse evenly, but encounter 'distinct spaces of resistance and support' which scientists try to overcome through standardisation.

For a while, circulation – as reflected in work on the Banksian Empire (Miller & Reill 1996) – dominated the literature of the geography of science (Shapin 1998). In 2004, for example, James Secord addressed himself to the matter of how knowledge travels. In taking stock of the advantages of considering science as a practical activity, located in the routines of everyday life, Secord concluded that old distinctions between words and things, between texts, books, instruments, and images had been broken down (Secord 2004). This however had been accompanied by a tendency for the means to become the end, for the method to become the conclusion: that knowledge was 'ineluctably local and variable' (Secord 2004, 659). There developed a corresponding parochialism evident in the writing of 'micro-histories' which failed to connect the local to broader contexts. The way out of this, he concluded, was a greater emphasis on the circulation of scientific ideas and of their reception in a range of contexts.

A discussion of circulation will sooner or later entail some reflection on actor-network theory, and Secord praised Latour for his emphasis on knowledge as an activity occurring in time and space, and for his attention to process,

reception, and audiences. However as an historian – and here he spoke for historians at large – he found Latour's construction of networks too ahistorical and unstable for interpreting anything but the most recent past. He also critiqued Latour's tendency to reduce networks to the centre-and-periphery archetype – which has elsewhere been described as 'an imperial model' (Secord 1994, 284; see also Driver 2001, 29-30) – rather than allowing for multiple centres. His greatest resistance, though, was to the attribution of equivalent status to the agency of human and non-human actors, a distinctly anti-historical idea. Certain historians, he observed, have adapted actor-network theory, redefining networks as 'relatively stable' rather than 'infinitely flexible' (Secord 2004, 664). Informed by anthropological perspectives, they have opted for a model of 'mutual interdependence' over that of centre and periphery.[11]

Another concept beyond Latour, adopted and adapted by historians of science (Secord 1994) and of museums (Alberti 2008), has been that of 'boundary objects': 'those scientific objects which both inhabit several intersecting social worlds … and satisfy the informational requirements of each of them' (Star & Griesemer 1989, 393). Arising from their study of the Berkeley Museum of Vertebrate Zoology, Susan Leigh Star and James Griesemer observed a type of museum object which had different meanings in different 'social worlds'.[12] However, the structure of such objects was common enough to these different worlds that they could be recognised by a broad range of users, and appropriated for an equally broad range of ends.

A further reaction to Latour is represented by the body of work on trust and scientific knowledge (Shapin 1991; Withers 1999). Latour had argued that new scientific claims were controversial and could only be stabilised or 'black-boxed' by subsequent statements from other scientists, or what he termed 'the

[11] For example Golinksi 2005

[12] Thomas Gieryn's work on boundary spaces was influential here (Gieryn 1983)

argument from authority' (Latour 1987, 31). Contrary to Latour's assertions, Stephen Shapin (Shapin 1991, 1994) observed that scientists do in fact frequently accept new scientific knowledge without having witnessed the research or the experimentation. In the eighteenth century this was a matter of gentlemanly courtesy, hence the notion of gentlemanly science. However, as science became increasingly institutionalised in the nineteenth century, trust hinged less on issues of class and more on expertise and on the standardisation of procedures, vouched for by the practising institutions.

Within this new regime, museums sought to achieve trust and hence establish their scientific authority by 'spatialising science' in a number of ways (Livingstone & Withers 2011, 5): through their architecture (Duncan 1995; Duncan & Wallach 2004; Forgan 1994, 2005; Yanni 1999); through their displays (Pickstone 1994, 2000); and through their use of particular objects (Alberti 2008; 2011). Alberti demonstrates how people and objects were endowed with authority within museums from the mid-nineteenth to the early twentieth century (Alberti 2009, 2011). As museums dispensed with boards of independent trustees, so museum directors reported directly to government, and there was a corresponding elevation of the status of curator from artisan to subject-specialist. But this was also the age of the object, and objects belonged unequivocally in museums. As collections grew, it became increasingly the practice to represent a species with its 'holotype' or type specimen. New species were identified in museums and hence, new type specimens were 'authored' there. They were highlighted in museum displays, and published across a range of scientific titles, conferring authority on the curator and the collection. Museum and print spaces were thus 'mutually constitutive' of new knowledge (Alberti 2011, 55-62).

In an earlier paper Alberti had argued: 'Museums were not simply channels for the dissemination of elite knowledge, but rather active sites for the

construction of ideas about nature' (Alberti 2008, 77). He was certainly not the first historian to make this observation, but what needs more attention is the specific nature of the knowledge produced in museums. John Pickstone (1994) has considered the issue in some detail. Using the Paris Muséum National d'Histoire Naturelle as a case study, he has defined what he terms 'analytical/comparative' or 'museological/diagnostic' science to describe that which which emerged in France in the late eighteenth and early nineteenth centuries. The rise of museological science was linked to the emergence of scientific specialists with command over large collections. It was new in that it was situated somewhere between the 'surface' practices of taxonomy and the model phenomena of experimentalists. Museological science was produced via analytical processes – what Pickstone terms the 'deconstruction' of specimens into elements – in order to produce classifications, or to better understand (and regulate) technical processes (Pickstone 1994, 113). This 'deconstructive' process was paradoxically constructive of both museum displays and scientific diagnoses. Museological scientific knowledge was produced within the spaces of the museum, albeit in new, specialised spaces such as laboratories, which were rarely publicly accessible.[13]

In the literature on the role of museums in the production of scientific knowledge, certain sites have received particular attention. The Pitt Rivers Museum in Oxford is one of these. Chris Gosden and Frances Larson relate how, in the last quarter of the nineteenth century, anthropology students at the Pitt Rivers were trained to engage with the collection in particularly physical ways to produce new anthropological knowledge (Gosden & Larson 2007). Originating with Pitt Rivers himself, it was believed that the cognitive process began with an accurate image registered in the mind. Looking properly, then, through the process of 'eye-training', was the first stage in

[13] Dorinda Outram's account (1996) of Cuvier's move from field science to museum is also helpful here.

thinking clearly (2007, 123). But there was equally an unprecedented emphasis on making, identifying, preserving, labelling, repairing, drawing, casting, and photographing objects, based on the understanding that the intellect was formed through physical actions and interactions with matter. Thus by training the body, one was simultaneously training the mind. Consequently, the best way to understand how an object was made and its possible uses was to dismantle and re-make or replicate it. In this context, the approach of Pitt Rivers, Henry Balfour and Edward Burnett Tylor might be compared to Cuvier and his practices of comparative anatomy. 'Embodied learning' was 'sensate, skilled, and substantial; to know was to handle, make and use objects as well as discuss and write about them' (2007, 238-39).

3. Cultures of public science

> Happily, Botany is not now, what it was a century ago, – a dry study, mainly employed to determine the names, or a few medical virtues, of Plants. A desire on my part, as Director, to popularize the science, and to render it generally available, has been approved and encouraged by the several First Commissioners, in a way which cannot fail to be of service to all classes of society.
>
> William Jackson Hooker 1856, 2

William Hooker's statement above encapsulates a specific sense of popularisation in use at the mid-nineteenth century: of making knowledge accessible or available to all. In fact, popularisation in the Kew Museum would never involve public lectures at Kew itself, let alone the botanical equivalent of giant diving bells or projected images of phantoms; it consisted, first and foremost, in throwing open its collections to the public gaze. This was in itself a significant step; after all, the collections in the Kew Herbarium were never to be subjected to the same public inspection, and as we have seen, long after the opening of the first Museum, there remained amongst certain Kewites a residual anxiety over affording the working classes such access.

Historians of science have illustrated the centrality of science to Victorian culture. From the exotic new species that flooded into London and were thence displayed in the BM and at Kew, to the novels whose characters were engaged in scientific pursuits, Victorians at all levels 'defined knowledge, ordered nature, and practised science' (Lightman 1997, 1). As Lightman demonstrates, a number of conditions merged to enable this cultural development: the growth of a literate middle class and the invention of new printing technologies led to the 'birth of a mass market' (Lightman 1997, 191) which displayed a huge thirst for scientific knowledge; people pursued science for social and affective ends; and they were eager to know the implications of new scientific discoveries for the crucial issues of the day – economic, ethical, social, political, and theological. Popular science writing tended towards the natural theological view of creation, but it had to entertain as well as instruct and developed its own register, with a 'diverting', non-theoretical style. Élite scientists who tried popularised forms of writing to supplement their incomes and to broadcast scientific naturalist perspectives, often fared less well in the marketplace.

However, in the early twenty-first century, popularisation as a term brings with it considerable baggage. It carries connotations of class and cultural difference. It has come to be understood as representative of a diffusionist model whereby scientific knowledge is created by a scientific élite and filtered down to a non-specialist public in a generally intelligible or appealing form, thus ignoring the conditions of its reception and the range of understandings thus produced. Furthermore, in taking such a line, it has been understood as denying the very possibility of scientific practice originating at non-specialist level (Lightman 1997, 189).

Calls for newer models of popular science extend back to the mid-1980s with appeals for researchers to attend to the 'wasteland between the sociology of collective behaviour and the history of scientific ideas' (Cooter 1984, cited in

Cooter & Pumfrey 1994, 238). With the parallel movement towards viewing science as culturally situated, however, studies began to reflect a view of science as 'a complete set of social relations linking different scientific communities with various allies, audiences, publics, consumers and reproducers' (Cooter & Pumfrey1994, 240). There have been attempts to recover the spaces where non-elite groups and individuals practised science (Desmond 1989; Secord 1994; Shteir 1996), to construct in effect a history of science 'from below'. This has required a shift from privileging ideas and texts to an intensified interest in practices and objects, emphasising the materials of science, the practices in which they were deployed, and the effect they had on the knowledge produced. Equally there has been greater attention paid to what has been termed 'public science' – 'the sites, the methods, the theatrics, and the individuals involved in the different social tailorings and legitimations of scientific knowledge' (Cooter & Pumfrey 1994, 243). This includes the way audiences for public science venues and events were constructed, how texts were adapted by producers (sometimes at the behest of patrons), and how science was perceived by popular audiences and appropriated for a range of ends.

As Morus observed, writing in the wake of Cooter and Pumfrey's call to action, 'the boundaries between the popular and the élite, the practical and the pure are always contingent and continually renegotiable' (Morus 1996, 404). The National Gallery of Practical Science – more commonly known as the Adelaide Gallery – which opened in 1832 off London's Strand, is a case in point. One of its aims was to allow working people – so often depicted in earlier histories solely as the recipients of popular forms of science – the opportunity to showcase their own inventions and thus appear publicly as autonomous inventors. Rather than constituting the Gallery's audience, they became, in effect, its subject matter. In fact, the audience at the Adelaide was characterised by its heterogeneity, the appeal of the 'marvellous and the

spectacular' being evidently broad in its reach. But there was another way in which the Gallery challenged boundaries between popular and elite, and that was in its displays. Natural and manufactured objects, sciences and crafts, appeared together with none of the traditional concerns for hierarchical arrangements, nor for creating distance between crafts and fine arts, or philosophical and applied science (Morus 1996, 434).

It was precisely at this moment of epistemological flux that the Museum of Economic Botany was conceived. When Hooker spoke of instruction in relation to the Museum of Economic Botany, he referred not to lectures or demonstrations held in the museum space – there were to be none – but to 'the method of arranging, mounting, and labelling the specimens, combining scientific accuracy with much useful popular instruction' and to the displays themselves which, he 'flattered himself', would prove equally instructive' (Hooker 1855, 4-5). The words of Hooker which head this section remind us that the act of popularisation lay in rendering botany 'generally available' via the medium of the Museum. But it is clear that it lay equally in moving botany beyond its origins in classification and nomenclature and beyond a preoccupation with *materia medica*. 'Economising' botany was, in itself a popularising gesture, and furthermore, the Kew Museum was the first to do so comprehensively. Visitors were reportedly struck by its novelty of form and function (Hooker 1855, 6-7). The first museum guide was even sub-titled *A Popular Guide to the Useful and Remarkable Vegetable Products of the Museum of the Royal Gardens of Kew,* popular presumably because of its utilitarian approach, its affordable price,[14] its use of popular names alongside the Latin binomials, and its illustrations. As Hooker was later to claim, by the introduction of the Museum he had removed 'the stigma, long and not unjustly

[14] From 1861-1875 the *Official Museum Guide* retained a cover price of 6d which represented good value when compared with, for example, the price of a single issue of *The Times* at 4d in 1861.

cast upon Scientific Botany, viz., that it is of but small *practical* use' (Hooker 1857, 3). It seems appropriate here, therefore, to borrow James Secord's alternative designation for popularised science in the Victorian context: 'commercial science'. The science displayed in the Museum of Economic Botany was commercial because, to cite Secord more fully, 'science was part of a commercial culture of exhibition, reflected in the glittering prose of journalism, in lecture demonstrations, panoramas, [and] museums' (Secord 2000, 437). Nineteenth-century science took place in a range of venues, and provided incomes for a range of practitioners including writers, specimen dealers, showmen, and museum curators.

4. Conclusion: placing the Museum of Economic Botany

In histories of nineteenth-century museums, the Museum of Economic Botany has been severely overlooked in favour of its metropolitan neighbours: the Royal Polytechnic Institution (Lightman 2007a, 2007b; Morus 2007); the Museum of Practical Geology (Yanni 1999; Forgan & Gooday 1996); the Hunterian (Alberti 2007); the South Kensington Museum (Barringer 1998; Kriegel 2007; Robertson 2004), and the Wellcome Historical Medical Museum (Larson 2009; Hill 2006, 2007), to name a few of those more recently scrutinised. Furthermore, although much excellent scholarly work has been conducted on botanic gardens – and particularly Kew – and on their role in the formation of new economic-botanical knowledge (Brockway 1979; Miller & Reill 1996; Drayton 2000; Livingstone 2003; Raj 2007; Endersby 2008; Johnson 2011; Sivasundaram 2011), there remains a surprising paucity of research into the role played by museums in the same process, and by the Kew Museum in particular. Other than references to the Museum in the texts cited (Bean 1908; Turrill 1959; Desmond 1995; McCracken 1997; Drayton 2000), the only other published sources are: Edward Alexander's chapter on William Hooker in *Museum Masters* (Alexander 1983), a rather hagiographic account which relies

on the same limited set of sources as other pre-Desmond histories; Gerald Wickens's brief institutional overview (Wickens 1993a; 1993b); the 'insider' guide to the *Plants+People* exhibit (Griggs *et al.* 2000); and a handful of object-based articles in the *Kew Magazine* and similar publications (Hastings 1989; Field 1998; Ponsonby 1998).

This thesis aims to place the Museum of Economic Botany amongst the recent literature on nineteenth-century museums, by concerning itself with the production of scientific knowledge and of the discipline of economic botany, in and by the Museum. Discussion of the nature of economic botany at particular moments in its genesis, leads, almost inevitably towards issues of epistemology, to the conditions of possibility of a field of knowledge and to its methods. In what follows, however, I am more concerned with the material traces of particular ways of knowing and seeing, and in how museums create interpretive frameworks for the 'visual consumption' of disciplines (Moser 2006, 2). To appropriate the eloquence of others, the thesis aims to 'combine historical and geographical specificity with attention to...epistemological issues in ways which do not slip into 'obscurantism or pretention' (Thrift *et al.* 1995, 2-3). In doing so it aims to provide a model for the study of other museums and of the construction of other fields of knowledge. More specifically, the thesis seeks to increase awareness of the history of the Museum of Economic Botany, of its contribution to the science of botany, and of the Economic Botany Collection which still exists at Kew; and to enable greater access to the Collection for a broader audience – in short, and to paraphrase William Hooker, that it might be rendered generally available, 'in a way which cannot fail to be of service to all classes of society' (Hooker 1856, 2).

Figure 2.1 Museum No. 3 c.1900

Photograph by E. J. Wallis; KPI O-139 ©RBG, Kew

CHAPTER THREE

Research Methods and Sources

EBC 11121: *Gardenia latifolia* Ait.

A small block of wood sits among the thousands in the racks of the Economic Botany Collection (EBC) store in the Banks Building at Kew. It measures approximately 10 x 15 x 5 cm; it is polished on one side, revealing the grain, and untreated on the other (Figures 3.1 & 3.2). It is cut longitudinally, and comes without bark or other plant parts. It appears more as a timber sample than a botanical specimen, and we can instantly discern from its scale that it was not intended as a spectacular display object. Casting round the racks, we see many others of similar appearance, bearing the same donor name and accession date, and from their commonality of size and presentation we can safely deduce that they were designed as a set. When we add to this an image, taken c.1900, which illustrates many woods of similar dimensions on display in Museum No. 3 (Figure 2.1), we can conclude that EBC 11121 was one datum in a reference collection, designed for the use of foresters, traders, and manufacturers, and displayed beyond the public gaze.

Our specimen bears inscriptions which can tell us more. Firstly we learn that it is more than an anonymous sample; the computer-generated label, dating from the construction of the collection database in the 1980s, gives its unique catalogue number – EBC 11121 – which was awarded at its point of accession into the museum collection. It is thus a museum object. By the designation of the plant family '84.01 RUBIACEAE' it becomes clear that the wood has been classified according to the Bentham-Hooker taxonomy, a system particularly associated with Kew. Colonial and metropolitan scientists have categorised it as a member of the coffee family and thus incorporated it into the epistemology of economic botany.

The front label – printed at Kew for the specimen's life there as a museum object – gives us further information. Its indigenous name – Papra – takes precedence, knowledge gained through collaboration with local people. This is followed by its botanical binomial – *Gardenia latifolia* Ait. – positioning it as a natural history object. We next learn the name of the donor – the Indian Forest Department, Government of India – and its point of origin – the Ahiri Reserve in the Central Provinces. In that one word 'reserve' is encapsulated the story of imperial forestry in India, and there is more to be discovered from other sources. But remaining for now with the label, we observe that usage information is also given: 'durable, and easy to work', data which accompanied the specimen from India and which are partly colonial and partly indigenous in origin, and like the local name, hint at networks of knowledge in the sub-continent. And a date is inscribed – 1878 – which quietly signals a possible connection with the world of international exhibitions (see below, and Chapter Six), but which we will leave for the moment.

The reverse label, from the donating institution, gives more detail of geographical provenance: the Chanda District of the Nagpur Division of the

Central Provinces.[1] Within this is contained a micro-history of British imperial expansion. The British annexed the kingdom of Nagpur in 1853, renaming it the Nagpur Province of British India. In 1861 it was merged into the newly-constituted Central Provinces. Chanda also played a significant role in the history of imperial forestry. The Central India deciduous forests of which it formed part were considered the most important of Indian forests, representing 'the type-forest of India' (Ribbentrop 1900, 13). In 1860 Chanda was one of the first districts to be awarded a conservator of forests (Barton 2002, 63) under the orders of the Inspector-General of Indian Forests, Dietrich Brandis. We are already in the realm of contextual sources to flesh out the history of EBC 11121 but before leaving the object we note a number on this label – C.1173 – and the same number stamped into the wood (Figure 3.3), to which we will return.

Fortunately museum objects are, by definition, accompanied by varying degrees of documentation, so beyond the object itself there are further sources to consult. The museum accessions register or 'entry book' reveals EBC 11121 to have been part of a large donation accessioned in 1878 and donated by Brandis.[2] In addition to records such as this, kept alongside the Collection, we also have access to the library and archives of the Royal Botanic Gardens. Here correspondence between Brandis and Joseph Hooker is able to tell us more about the details and circumstances surrounding the donation.[3] But in this case the most illuminating source proves to be a publication. The story of these woods is given in James Sykes Gamble's magnum opus *A Manual of Indian Timbers* (Gamble 1881) in which he describes the 1878 woods as 'a collection which was undoubtedly the most complete that has ever been formed in India and sent to Europe for exhibition'. As well as the main set sent to

[1] Known since 1964 as Chandrapur

[2] RBGK EBC, Museum Entry Book 1861-79, EBN 64.1878

[3] RBGK Archives, DC/2/1/3 Letters to J. D. Hooker: COL-DEN c. 1845-c.1905 Vol.3, f.161

Paris, 'a number of duplicate sets…[were] also prepared, sufficient to supply a good stock to the Royal Gardens at Kew, and to other museums both in Europe and America'. Gamble was Assistant Conservator of Forests in India at the time and helped supervise the preparation of the specimens. It is here too that we learn the significance of the number C.1173 on the original label: 'From the Central Provinces, the Conservator, Captain Doveton, sent a collection of well-seasoned pieces, numbering 1101 to 1186, procured by Mr. Richard Thompson from the Chanda forests', with 'C' representing the source region of Central India.

This knowledge of named actors could take us in the direction of exploring 'imperial careering' (Lambert & Lester 2006). It could certainly enable us to discover more about these actors and the networks of which they formed part. Doveton, according to Berthold Ribbentrop (who was to accede to the title of Inspector-General of Forests in 1884), was one of the first officers of the Indian Forest Department appointed without special previous training who 'left their permanent mark in the history of the progress of forest administration in India...[and] will long be remembered in the Annals of the Department' (Ribbentrop 1900, 79). Thompson, too, was to make his mark on imperial forestry. Later in 1878 he was asked by Governor Frederick Napier-Broome of Mauritius to study and prepare a plan for the renewal of Mauritian forests (Cheke & Hume 2008). He was thus able to transfer his knowledge of sustainable forestry and reforestation to a new location, adapting it as he went. At this point our research has not taken us beyond Kew to other archives, but that is the next stage in learning more of the object's pre-Kew lives and in viewing its histories from other perspectives.

The above account of this unprepossessing specimen serves a number of purposes: it introduces the idea of museum objects as primary sources, which can be read through their inscriptions, their materiality, and their museum

documentation; it illustrates the research method used in this thesis to (re)construct the object's biography – a tiered approach which moves from the object, to supporting documents, to images, and thence to contextual literature; and it hints at the merits of tracing the lives of things. Such merits include the ability to delineate networks, as we follow the object through each stage of its life between individuals and institutions. Further, through examining the object's inscriptions and descriptions, the object biography lays bare the various epistemological regimes to which the object has been subjected. From a material culture perspective it enables us to understand the processes of negotiation which enable the circulation of commodities, and the differing values attributed to a given object at each stage of its journey, in a range of spatial and temporal contexts. The block of wood which was to become EBC 11121, or at least a duplicate of it, appeared at the Paris Exposition as a sign of a new order in imperial forestry, and of the plenitude and utility of Indian timbers. In the Kew Timber Museum it came to represent Kew's authority with regard to the plant resources of empire. Now in the collection store, it has, since the late 1980s, served as a point of reference for wood anatomists, and in this thesis becomes a historical document and a metonym for the Economic Botany Collection.

However, this thesis consists of more than a series of object biographies. They represent only one element of a multi-layered approach to the Museum of Economic Botany which combines statistics, images, and interviews, as well as the more 'traditional' archival and published sources. As the given example has demonstrated, such an approach enables a continual shifting of perspective from the micro-history of the object and the spaces through which it has passed, to the macro-history of nineteenth-century botany, empire and the 'exhibitionary complex', connecting the former to the latter in the process.

This chapter has two aims: to describe and account for the research methods and sources selected for the thesis, and to explain the rationale for the temporal and territorial span represented by the case histories. The first section considers the methodological issues arising in research on practices, objects and networks which constitute the 'how' of the thesis. The second section provides a short account of those sources which have proved most valuable in providing answers to the research questions. Here, significantly, it is museum objects which head the list. And the third section begins with a quantitative analysis of the changing shape of the Economic Botany Collection and thence provides a rationale for the selection of case histories, explaining how they are both representative and unique, and how this matters in the process of constructing historical geographies. The final section outlines the overall structure, before leading into the second part of the thesis.

1. Methodologies: practices, objects, and networks

> No precise instructions having been laid down for my guidance by the Honourable Commissioners of Woods, &c., I felt that I might advantageously follow many of the suggestions of Dr. Lindley in the Report.
>
> William Hooker 1845 [4]

Practices

In his work on Joseph Hooker and the practices of Victorian science (as discussed in Chapter Two), Jim Endersby highlights the importance of a practice-based approach to researching the production of scientific knowledge: 'We have a rich history of scientific ideas but almost nothing on the scientific practices which made those ideas possible'. It is in the detail of everyday activities, he continues, that we gain a greater understanding of how 'the most

[4] 1845 (280) *Kew Gardens. Copy of Report from Sir W. J. Hooker, on the Royal Botanic Gardens, and the proposed new Palm House at Kew*, p.2

sophisticated theoretical speculations' arise (Endersby 2008, 6). The practices scrutinised by Endersby range from the more generic and routine practice of 'corresponding', to the finest details of the papers and other materials deployed in 'collecting' and 'classifying' plants. Indeed it is in the latter regard that he demonstrates how Hooker's overriding preference for 'lumping' species can be related to the size of herbarium sheets and the cabinets disposed to house them. The study of practices thus highlights the spatial dimension in histories and geographies of science. And it has a further benefit: it makes visible processes of negotiation, allowing us to understand 'the full range of participation in the making of scientific knowledge' (2008, 55) whilst affording equal weight to the multiple actors in networks of science. Additionally, the examination of material practices reveals the lack of inevitability in scientific endeavour and the haphazard nature of scientific enterprise. As an example, the Hookers issued lists of 'desiderata and inquirenda' (Hooker 1849, 409) to collectors, but by definition these excluded the new and exotic discoveries which were often made in the field.

In recent years historians of museums have explored the ways in which museum practices shaped the knowledge produced within and beyond the museum space. Stephanie Moser focuses on the collecting and displaying of objects, and how audiences interact with these as part of an active process of reception (Moser 2006). Others look at the practices of museum education (Forgan 1994; Alberti 2011), and of preservation (Alberti 2007). With such a range of activities represented in the museum archives at Kew, the task has been to select those which appear to have had the greatest impact on the production of scientific knowledge. For the purpose of the thesis, I have turned to the categories used in John Lindley's landmark 1838 report into the management of the Royal Gardens. This was the document which persuaded Viscount Melbourne and his government to transfer ownership of the Gardens to the public domain and, as William Hooker's words above indicate, the one he

used as a charter for the newly-public Kew Gardens. It gives us, therefore, an indication of the strategic priorities identified for Kew in its early public phase. In concluding his report, Lindley insisted that 'in short, the Garden should be perfectly adapted to the three branches of instruction, exhibition, and supply'.[5] These categories, intended as a shorthand for the strategic functions of Kew as a whole, can also be readily applied to the Museum in particular. *Instruction* in the Museums took the form of instructive displays and guide-books, and also involved a series of initiatives targeted at discrete audiences, raising issues of pedagogy, training, and 'popularisation'. *Exhibition* covers the vast range of elements involved in display, from architecture to labelling. And *Supply* is reflected, not only in the knowledge passed on from the custodians of the Kew collections to merchants and colonial residents, but in the Museum's role as a 'clearing-house' for botanical specimens to the wider museum community. These three thematic headings thus encapsulate a wide variety of museum practices.

Objects and collections

If practices provide the most appropriate way of evaluating the agency of space and people in and beyond the museum buildings, how best to consider the assemblage of objects – the collection – which lies at the museum's heart? How, in short, to write the history of the collection as a whole? Collections histories, as is clear from much of the published work, can be object-, process-, or people-centred, and in practice are often multi-faceted. In a thesis which treats the subject of museum knowledge-making in the mid- to late-nineteenth century, a period when the object was prized by museums, universities, and schools as a medium of instruction, there would appear to be a *prima facie*

[5] 1840 (292) *Botanical Garden (Kew). Copy of the Report made to the Committee appointed by the Lords of the Treasury in January 1838 to inquire into the Management, &c. of the Royal Gardens at Kew*, p. 5.

argument for an object-based approach. First, however, we need to consider the collection itself as an object of study.

Collections biographies

Seen from the perspective of an individual object, studies of collections or sub-collections as aggregates are the equivalent of 'histories from above'. Studies of this kind take the macro-perspective of the collection as a single organism or 'shifting mass' subject to the forces of time, change, and the 'nature of becoming' (Gosden & Larson 2007, 7). To conduct such an analysis in quantitative terms requires reliable, accessible and consistent data, either in the form of hard-copy collections catalogues (card indexing systems, registers, and the like), or their digital equivalent, the computerised database. In *Knowing Things*, Chris Gosden and Frances Larson used the collection database at the Pitt Rivers Museum to view the collections 'in their entirety' and to create 'a broader history of shifting relationships, working practices, and ideas' (2007, 10) than would be possible using an object biography approach. Data displays – graphs, pie charts, and tables – make visible the changing structure of the collections over time, although the effect, as the authors readily acknowledge, is to prompt more detailed questions, rather than to provide the answers. The patterns that have been uncovered are, therefore, 'suggestive, rather than conclusive' and have of necessity been 'complemented' with traditional archival sources 'to piece together a more nuanced and complicated history of people and things' (2007, 29). There are no object biographies in Gosden and Larson (2007), though there are human biographies which serve to 'animate' the larger, statistical history; so people become individualised, whilst objects remain exemplars of types rather than unique bearers of meaning.

If *Knowing Things* is a quantitative history of a collection in aggregate, then Frances Larson's work on the Wellcome Collection is a qualitative account of *how* Sir Henry Wellcome 'collected the world' (Larson 2009). It is therefore partly about the mechanisms and processes of collecting, but insofar as it 'seeks to distil some pattern and purpose' from the apparent chaos of Wellcome's material legacy, then it is indeed 'the biography of a collection' (2009, 4). Of course, such a biography is intricately entangled with that of the man who caused the collection to be formed but here the focus is more on Wellcome's social networks than on his psyche.

In this thesis, the biography of the Economic Botany Collection *en masse* acts as a means of establishing the Collection's shape and purpose, and as a framework for the in-depth study of objects. Significantly, however, collections such as the EBC need to be set in a wider context. In constructing their history of the Pitt Rivers Collection, for example, Gosden and Larson soon found themselves 'beyond the boundaries of the Museum'; indeed, the links to the wider world proved to be 'infinite', leading to the notion of the Museum itself as 'an aggregation of people and things that stretches beyond its immediate physical confines' (Gosden & Larson 2007, 1-11). Meanwhile, in writing her biography of the Wellcome Collection, Larson discovered similarly that the history of the collection constantly drew the narrative away from Wellcome himself and towards the people who collected for him.[6] In a collector-based approach like Larson's, the shifting geographies of the collection worked to displace the collecting subject from the centre of the frame.

Rather than approaching the collection as a ready-formed entity to be analysed and categorised into component parts, I am particularly concerned with tracing the trajectories and histories of objects as they come together in the museum to

[6] See also Hill 2004

become the collection. This placing of objects at the centre of the frame is the essence of the object biography.

Object biographies

As related in Chapter Two in the discussion of the literature on museums and knowledge production, the notion of an object having a history or biography stems from the concept of the 'life cycle' in the natural and social sciences and has been a subject of interest in the archaeological and anthropological fields since the mid-1980s. Object biographies consider the social circulation of commodities and the process by which they acquire value. Put simply, exchange creates value; (Appadurai 1986, 3) things have no intrinsic value or meaning beyond those imposed on them in processes of human exchange. But as Arjun Appadurai points out, a concern solely with value cannot in itself illuminate 'the concrete, historical circulation of things' (1986, 5), so to write an object biography, what is required is a multiple focus on value, materiality, and mobility. These are co-constitutive categories, since key factors in the creation of value are the object's ability to travel, its form, and its properties. Chapter Seven of the thesis treats the object biography of a totem pole from British Columbia which transited through Museum No. 3 at Kew and now resides in the British Museum, and demonstrates how it was the very materiality of such objects – their imposing scale and their exotic carvings – which formed the basis of their appeal to exhibition commissioners, museums, tourists, and anthropologists alike, and caused their redistribution across North America and Europe. The idea that objects have social lives is, of course 'a conceit', but it nevertheless provides a method for considering the power relations – 'human transactions and calculations' – inherent in the acts of exchange and valuation (1986, 5).

Appadurai distinguishes between 'cultural biography' on the one hand, and the 'social history of things' on the other. The latter pertains to classes of objects,

for example, totem poles in general, and is concerned with a longer-term timescale in which the meaning of the object category can change significantly. This method might, with some adaptation, be deployed in the long-term history of a large collection. Cultural biography, on the other hand, relates to individual objects and the unique biographies they accumulate through changes of ownership and usage. The focus here is on the object's trajectory through phases of production, exchange, and consumption throughout its series of lives, up to its extinction or present-day status. Again the totem pole in Chapter Seven serves as an example, where a present-day Haida carver in British Columbia provides an interpretation of the pole's iconography and an evaluation of its craftsmanship which firmly repositions it as an art object with contemporary relevance.

Also influential within the literature on object biographies was Igor Kopytoff's essay on the use of cultural biography, which defined certain methodological parameters:

> Where does the thing come from and who made it? What has been its career so far, and what do people consider to be an ideal career for such things? What are the recognized 'ages' or periods in the thing's 'life', and what are the cultural markers for them? How does the thing's use change with its age, and what happens to it when it reaches the end of its usefulness? (Kopytoff 1986, 66)

As Kopytoff indicates, this approach, focusing on the object as a 'culturally constructed entity, endowed with culturally specific meanings, and classified and reclassified into culturally constituted categories' (Kopytoff 1986, 67-68), can bring to light issues of object polysemy which might otherwise remain in obscurity. Thus the object biography approach emphasizes the spatial and temporal contingency of value; it concerns itself with the object 'whose importance shifts with every minor change in context' (Kopytoff 1986, 90).

If, like Appadurai and Kopytoff, we consider the museum object as a circulating commodity, then it becomes possible to escape a common approach to the formation of collections which assumes a mono-directional flow from periphery to centre. And if we accept, as this thesis does, that 'the primary and immediate purpose of the transaction is to obtain the counterpart value' (Kopytoff 1986, 69), we can then highlight the multiple agents involved in the construction and re-construction of the collection over time and space. 'Supply' was the term Lindley used to describe Kew's function as a provider of plants, knowledge, and people to the broader botanical community, but it was a term understood as a one-way process. Object biographies enable us to look at the processes of exchange involved in the building of a collection and to understand these as constitutive of the practice of circulation rather than supply. Chapter Six of the thesis challenges the notion that Kew was merely an agent of supply, and conversely the notion that the Museum built its collection through a uni-lateral flow of objects from peripheries to centre. Instead it reveals the circulatory patterns taken by objects which reveal processes of exchange and negotiation, and the complex networks in which colonial institutions were engaged.

A criticism levelled at the biographical approach regards the question of representativeness: to what extent can the story of individual objects 'stand in' for that of whole classes of objects and collections? In this context we can draw some insight from historical research in other contexts, specifically and literally 'biographical' ones. A similar issue is tackled by Miles Ogborn in his book *Global Lives,* an historical geography of trade and empire in the British world. Ogborn's study is conducted on a grand scale, both temporally and spatially, and is particularly concerned with the analysis of 'long-term webs of connection' (Ogborn 2008, 3). Within this context the biographies of individual people are used to 'animate' the somewhat abstract process of tracing histories and mapping geographies and to throw into relief oft-intersecting networks.

The world is thus presented from a multiplicity of viewpoints, emphasising the agency of individual human actors in global processes. But do these individuals' life-histories 'stand for' the lives of others, or must they only be understood in their own terms? Ogborn's conclusion is that they are 'both typical and exceptional' (Ogborn 2008, 12), and it seems to me that by extension, the same can be said of objects in a museum collection.

Networks

Gosden and Larson's view of the museum as 'an aggregation of people and things' extending beyond the museum walls and involving a variety of events, negotiations, and technologies, reflects the influence of actor-network theory on historians of museums and collections. In reality less a theory than a method, ANT was first developed as a means of understanding processes of innovation and knowledge creation in science and technology, as discussed in Chapter Two. Bruno Latour constructs his approach, stage by stage, in his decisive 1987 work, *Science in Action*. His interest is in knowledge as a socially-constructed phenomenon rather than a cognitive process, and in the 'how' rather than the 'why'. In the Latourian universe, knowledge does not simply 'diffuse'; it is interpreted or 'translated' by individuals according to their own biases and circulates in material forms via networks consisting of human and non-human actors. According to Latour, networks are transient, and have continually to be made and re-made. Relations between the human actors in the networks must be repeatedly reinforced if the network is not to disintegrate. Unlike many historians, Latour does not dwell on the intentions of the actors; his concern is with processes, and this explains his views on agency. Across the network, agency is attributed equally to humans and non-humans, or more specifically to the associations between the two.

ANT offers a distinctive way of approaching the networks of collection and knowledge practised at Kew. Take, for example, the theme of enrolment. Richard Drayton gives an account of how William Hooker called on Whig allies such as Lincoln, Aberdeen, Russell, and Carlisle to assist him in extending the collections of the Gardens and Museum (Drayton 2000, 170-220). Informed by ANT, this act can be seen as a mobilisation of resources, or 'the ability to make a configuration of a maximum number of allies act as a single whole in one place' (Latour 1987, 172). Hooker's chapter on botany in the Admiralty's *Manual*, detailing what material should be collected and how it should be prepared for the Museum (Hooker 1849, 400-422) can, from the perspective of ANT, be apprehended as an attempt to render objects stable, mobile, and combinable so that they could traverse the naval infrastructure and be identified, classified, and displayed at the Kew Museum. Prompted by the *Manual* chapter, Viscount Palmerston – the Whig Secretary of State for Foreign Affairs – instructed consuls abroad to similarly submit items for Kew's museum collections. Collectively these acts can be understood as a project of rendering the Museum of Economic Botany the 'obligatory passage point' (Latour 1987, 150) for specimens of economic plants and artefacts of plant origin. This term relates to the process of making particular institutional sites indispensable to a particular field of science, and of making that science indispensible to the wider community. By becoming the first port of call for all botanical collections made at government expense, as was the case by 1854, Hooker had gone a considerable way towards making Kew indispensable to imperial botany, and making botany indispensible to the process of imperial enrichment. As he expressed it: 'it is indubitable that every year more and more information will be elicited on points of no slight importance to a great mercantile country' (Hooker 1856, 3).

A network, Latour reminds us, 'is a concept, not a thing out there. It is a tool to help describe something, not what is being described' (Latour 2005, 131).

The means to making networks visible, therefore, lies in the material traces left behind by the constituent actors, both human and non-human – in objects, documentation, and correspondence. The sheer extent of the Directors' Correspondence at Kew, filling over two hundred bound volumes, with letters relating to most objects in the EBC, is testimony to the efforts taken by Hooker, his collaborators, and his successors to 'perform' human relations across a wide range of networks. As in all science studied 'in the making', there was nothing inevitable in this; a number of these networks had been established during the Banksian era, and were reconstituted by Hooker and his successors who had to work constantly to sustain, expand, and multiply them. In this thesis I use Latour's notion of networks as a framework through which I consider these networks of knowledge and collection. In its emphasis on studying science 'in the making', in its privileging of processes over intentions, and in its attendance on networks, Latour's perspective offers the possibility of a re-assessment of the Kew Museum in which practices, objects, and networks are privileged over heroic narratives.

2. Sources[7]

Objects

This research project starts and ends with those museum objects which were formerly displayed in the Museums of Economic Botany and are now stored in the Banks Building at Kew (Figure 3.4). As the example at the beginning of this chapter demonstrated, museum objects function as sources by virtue of their very materiality: their form, their scale, their typicality, and their curiosity, all have much to tell us as to why they were collected, which audiences they were intended for, and how they were displayed, as well as providing us with the raw material to consider their reception across a broad spectrum of time and place. Moreover many museum objects are quite literally

[7] A complete list of sources is given in the bibliography.

inscribed – with text, numbers, and labels – which represent practices of identifying, classifying, accessioning, cataloguing, and displaying – and which act as documentary evidence of the trajectories they have taken, and the values which have been attributed to them.

Collections documentation can provide further evidence concerning museum objects. The EBC is thus supported by hand-written entry books, recording accessions from the opening of the first Museum. These are kept, not in the Kew Archives, but in the EBC Office, as they are working documents, constantly consulted and updated by the curator. The entry books give details for most of the objects accessioned into the Collection regarding donors, dates, and provenance. While the entries are not consistently informative (as is shown below: see Section 3), the entry books do mark the start of the documentary trail which will delineate the social lives of the objects considered in the thesis.

RBGK Archives

Aside from the accession registers and other documents directly associated with the EBC at Kew, the substantial RBGK manuscript archives represent the next major area of sources. Particularly valuable have been those sources connected with the work of the museum curators, much of which were uncatalogued at the commencement of research work for this thesis. Partly in response to the needs of the present project, a significant proportion of this material has now been catalogued and the contents summarised. These boxes contain correspondence, registers, ledgers, and manuscripts relating specifically to the curators, and they indicate the extent and nature of the practices conducted at the Museum.[8] That the curators corresponded

[8] They include: QX 92-0063 Letters regarding Economic Botany Exhibits in the Museum 1867-1890; QX10-0029 Hillier's Records 1901-1926; QX 93-0002 Museum Records c.1850-1980 (9 boxes). See the list of sources in the Bibliography.

extensively with contacts in Britain and overseas has been in itself something of a revelation. Prior to this, there was a prevailing view at Kew that only the directors were engaged in official correspondence, and that written communications were passed down the hierarchy for the appropriate officer to provide comments. Such sources can throw new light on the networks in which museum staff operated through the exchange of letters, data, and objects, and indicate that the Museum was more of a collaborative project than previous writers have allowed (Bean 1908; Turrill 1959; Alexander 1983; Wickens 1993a).

Objects intended for the Museum were frequently discussed in correspondence to Kew directors prior to their despatch, and so the Directors' Correspondence is an equally essential body of material to consult. This consists of the scientific correspondence received by senior staff from 1841 to 1928, as well as William Hooker's correspondence from before 1841 which he brought with him to Kew. In most cases, only incoming correspondence is held – a fact which can be frustrating – though occasionally a copy of the Director's response is filed alongside. During the course of my research, an increasing proportion of this material has been digitised and made available via the JSTOR Plant Science database, and this process is ongoing.

A third section of the Kew Archives of particular significance for this project consists of the series of Miscellaneous Reports. These bound volumes contain printed reports, correspondence and miscellaneous items, dating from c.1850 to 1928, relating chiefly to Kew's relations with botanic gardens and other overseas institutions. They are essentially concerned with economic botany matters and filed geographically. Documents relating to the totem pole in

Chapter Seven, for example, are mostly to be found in Miscellaneous Reports under 'Canada Cultural Products.'[9]

Kewensia

Literally, 'things about Kew', this is a section of the Kew Library dedicated to the history and development of the Royal Botanic Gardens, Kew, and consisting of books, pamphlets, maps, plans and images. The Kew annual reports and museum guides which have been an essential source for the research project are held here, as is the Kew Picture Index (KPI) – a collection of photographs dating back to the 1880s which includes many interior and exterior images of the Museums. In a thesis which leans heavily on pictorial sources to evaluate display techniques, visual evidence of an object *in situ* has been a primary factor in the selection of case studies.

The KPI images, however, have mostly been taken from a wide angle, which has privileged understandings of the general disposition of space and objects in the Museums over the individual objects in display cases. Consequently, when a donation of photographs was received from Leiden Botanical Garden in 2011 including a face-on view of a display case in Museum No. 2 dating from 1902, it became possible to study in detail the mechanisms of display and to speculate on the processes of knowledge production adopted in the Museums.[10] The Leiden photographs were accessioned into the Economic Botany Photograph Collection, the remains of those photographs once on display in the Museums of Economic Botany. These form part of the Kew art collections, which also include the portraits of botanists once displayed in the Museums, and the vast collection of botanical illustrations. The photographs are filed by plant genus –

[9] RGBK Archives, Miscellaneous Reports (MR) MR/615 Canada Cultural Products etc. 1862-1909

[10] See Chapter Four and the discussion of Figure 4.1

in the same way as they were once displayed – and they have provided evidence of museum practices on a number of levels. Chapter Four discusses them in more detail.

Archives beyond Kew

By its very nature, an object biography methodology requires researchers to pursue the documentary trail left by an object as it moves across time and space. Of necessity, therefore, a project such as this must draw on a variety of external sources and materials. These have included the archives of other museums such as the Natural History Museum, the British Museum (BM) and the V&A; government documents at the National Archives; and the immense India Office archive held at the British Library. In the case of the Canadian totem pole and the Tasmanian timber trophy, discussed in Chapters Seven and Eight respectively, the availability of digitised archives has been invaluable, significantly extending the chronological range of the thesis. In addition, in 2011 I was enabled, through travel grants from RHUL and the Royal Historical Society, to visit the archives of several Indian museums and research institutes, as reflected in the contents of Chapter Six.

One must be aware of the biases inherent in an imperial archive like the one at Kew, not only as a result of the purposes for which it was accumulated, but also reflecting the kinds of people who worked for the institution. A reliance on the Kew archive alone would be insufficient to unearth the histories of those subalterns who were also part of the networks which converged on the Museum of Economic Botany. Chapter Six of the thesis aims to offer a more decentralised view of the way in which knowledge of India circulated, and this approach calls into the play the role played in the process by South Asians themselves. The aim has been to achieve a certain reinscription of indigenous agency into the narrative and to discover something of those Indians working

in museums in the nineteenth century, in particular, the contribution made by T. N. Mukharji of the Indian Museum in Calcutta. Only one trace of Mukharji's existence was to be had in the Kew archives, but by visiting the Indian Museum, I was able to find more evidence of the man and his actions – in letters, memoranda, and staff photographs.[11]

Other museums

One way in which the thesis measures the contribution made by the Kew Museum to the discipline of economic botany is by including within its remit other economic botany museums and collections with which the Kew Museum was associated. These were often established using objects and advice from Kew, and so similarities of form, arrangement and ethos can be striking.[12] At the same time, trying to recover a sense of the visitor's experience of the Museum of Economic Botany from pictorial sources alone has its limitations, especially in revealing the complexities of the museum effect and affect (Alberti 2007). Consequently, visits to the Industrial Section of the Indian Museum at Kolkata and the four museums at the former Imperial Forestry Institute at Dehradun,[13] which opened in 1901 and 1930 respectively and which borrowed considerably from the Kew model, enabled me to gain a first-hand understanding of the sensual experience of visiting such museums – their sights, spaces, sounds, and smells (Figures 3.5 and 3.6). It became clear, as my eye moved iteratively between specimen, model, map, and manufacture, how these elements may have been appropriated by visitors to Kew, in short how they produced scientific knowledge. And walking the galleries according to the

[11] Letter from George Birdwood at the India Office, Whitehall, dated 4 October 1886, to Thiselton-Dyer, requesting that Mukharji be permitted to visit the Kew Museum with the Director's assistance and suggesting that he would be a useful correspondent; RBGK Archives, DC153, f.40. Accessed 29 October 2012 from JSTOR Plant Science: http://plants.jstor.org.ezproxy01.rhul.ac.uk/visual/kdcas4896

[12] Adelaide and Missouri in particular; see Chapter Nine

[13] Now the Forestry Research Institute of India (FRI)

order of the cases, the theoretical underpinnings of each institution became embodied.[14]

Literary sources

The object biography aims to document the life of the object at its various stages of production, circulation, and reception. In considering the experience of visiting the Kew Museums, we face a considerable challenge given the ephemeral nature of evidence in the form of diaries and journals. I have consequently followed the example of writers such as Kate Hill (2005), Stephanie Moser (2006), and Samuel Alberti (2007, 2009) in looking at newspapers and periodicals, commercial guide-books, and accounts of the Museum in literary works, including popular histories, poetry, and novels. By understanding the audiences for whom each of these was written, such mediated reports shed light on the expectations of, and reactions to the Museum of the various constituencies which together formed the heterogeneous museum-going public. The work of Charles Dickens, whose writing spanned a variety of periodicals and novels, has been a touchstone throughout the research. Dickens' extraordinary ability to signal and heighten the concerns of his time is reflected in the account of the Museum of Economic Botany, written by Dixon, which he published in *Household Words* in 1856; and Dickens' own novels contain numerous references to materials and manufacturing, confirming the view that the Victorians shared 'a concern with economic botany across the British Empire (Drayton 2000, 194-5)'. Further, his portraits of various episodes of public engagement with the 'exhibitionary complex' have served to recover a sense of what may have motivated and informed a visit to a museum such as the Museum of Economic Botany.

[14] The India Museum has a commercial arrangement – gums, fibres, woods, etc.; FRI follows a botanical arrangement, albeit in alphabetical order by genus, rather than in taxonomic order.

Interviews

The desire to recover a sense of visiting the Museums of Economic Botany has prompted a series of interviews with people who remember visiting them. Respondents were recruited via Kew networks and interviews were conducted according to an agreed schedule of questions (for full details see Appendix III) and were recorded with respondents' written permission. All recalled visits to one or more of the Museums; earliest recollections dated to the 1950s when all four museums were extant. Two recalled visits in their childhood, others as young adults, one as a parent with young children, providing a range of perspectives. The outcome for the research project has been a better understanding of the visual, olfactory, aural, and affective experiences of negotiating the museum spaces, and an increased awareness of how particular objects were encountered and appropriated. The account of the indigo factory model in Chapter Four is an example of where interview material was drawn on as evidence of the model's reception in the museum environment.

In addition a number of former museum staff were interviewed according to a different question schedule and similarly recorded. These respondents ranged from a former head of ECOS,[15] through curators, to museum assistants and were contacted similarly via Kew networks. Their cumulative evidence has helped reconstruct the most recent, yet least documented history of the Museum and the Collection. This has been particularly helpful in understanding, for example, the mechanics of the transfer of the wood collection to the Banks Building in the 1980s, and the process of compiling the database, which has in turn informed object biographies such as that of the Tasmanian Timber Trophy in Chapter Eight. An unforeseen outcome of the interviews has been the opportunity to view a range of ephemera retained by

[15] ECOS: Economic and Conservation Section

respondents – museum posters, leaflets, guide-books, articles – which have acted as further documentary sources for the thesis.

3. The changing shape of the Economic Botany Collection

Chapter One began with a definition of the Kew Museum as a dispersed and mutable assemblage of people and things, involving multiple agents constructing and re-constructing the Museum over time and space. This is reflected in the ever-changing nature of the Economic Botany Collection. Prior to determining a precise timescale and selecting object biographies for the thesis, it was decided to conduct initial quantitative analyses of the EBC at periodic intervals of twenty years, commencing in 1850, shortly after the opening of the first Museum.[16] These analyses are best understood as 'trial trenches' into the Collection (Gosden & Larson 2007, 12), less concerned with revealing long-term trends or patterns (though they may be suggestive of these), but rather reflecting various circumstances of collecting at specific moments, such as economic botany initiatives, exploration, annexation, scientific prerogatives, technological developments, and the fall-out of the 'exhibitionary complex' (Bennett 1995), as well as changes in the internal organisation and mission of the Royal Botanic Gardens.

The EBC electronic database, using software unique to Kew, was constructed in the 1980s on the closure of the remaining two Museums. As displays were dismantled, objects were entered onto the database before their transfer to the Banks Building. A typical entry appears thus:

```
Cat. No.: 41464      Location: Bottles, boxes etc
EBN: 85.1895
160.00 SALICACEAE Salix sp

Artefact description: Unfinished cricket bat
```

[16] There were no accessions in 1990, so in this instance, data from 1991 have been used.

Donor: Army & Navy Stores
Common name(s): Willow
Part(s) held: Wood

Uses:
Wood Use: Cricket bats User: Man
(TDWG Use: MATERIALS - Wood)

Notes: Label source: Cricket bat manufacture. Bat faced, the lower part pressed and hammered showing the effect of the process.

The database fields and structure are based on those used for Kew Herbarium specimens, with extra fields relating to uses added for the EBC. The system of cataloguing by botanical family, based on the Bentham-Hooker taxonomy, has the effect of reducing a manufactured object – in this case a cricket bat – to a representation of a botanical species, in order to 'combine' it into the Collection. The database was not, therefore, designed with historians' needs in mind, and it is not searchable by accession date. Furthermore, it is important to emphasise that it is a database reflecting the state of the collection at the point of its creation, augmented by subsequent accessions, rather than an historically continuous register of accessions. Consequently, for the purposes of the present thesis, accessions data for successive periods had to be compiled manually, by referring to entries in the Museum entry books for the given years. Unfortunately these do not provide all the information required; for example, high-volume accessions are frequently listed without individual itemisation, so we often have little idea of the precise quantity of material concerned or even the type. Some entries refer to lists which have since disappeared. Such data gaps have precluded the production of detailed volumetric data-sets on the Collection. Instead, accessions have been tabulated here as accession 'events', producing useful data regarding the frequency with which particular objects, from particular donors, and in particular places, entered the collection. Accessions were analysed according to a number of criteria: type of donor; object type (raw material, ethnographic artefact, or

manufactured object); and geographical source. These categories are not Kew's own, but have been formulated to suit the interests of the research project, and the accessions were coded accordingly.

At the level of total accessions (Figure 3.7), a ten-year moving average was devised to give an indication of longer-term trends. On the basis of this, four key periods emerge. From 1850 to 1914, collecting across all categories was at its highest levels during what might be termed the 'youthful' phase of the Collection. There was still active collecting in the period from 1915 to 1938, albeit it at reduced levels; this equates to a period of maturity in the life of the Collection. The curve of the graph over the period from 1939 to 1968 is a direct reflection of the post-war period of decline of the Kew Museum and the closure of Museums 2 and 3 in 1959. In addition the Museum lost its research function in 1966, and in 1967 the post of Economic Botanist at Kew was abolished.[17] Much of the Museum's former work in this area passed to the Mycology Section of the Kew Herbarium or to the Tropical Products Institute. Under this new structure, networks were established or re-established with botanical institutions overseas such as the N. I. Vavilor All-Union Institute of Plant Industry in the then USSR and the Leiden Rijksherbarium respectively. By the 1970s, reflecting the new power hierarchy at Kew, many accessions came to the EBC via the Herbarium, which increasingly became the chief point of entry for specimens. From 1969 onwards, the Museum experienced a flurry of accessioning activity, particularly of wood specimens, again largely in the form of transfers from other Kew departments – the Herbarium, Jodrell Laboratory, and ECOS. This was partly as a result of collecting activity from expeditions (see below) and a little later, in response to the new storage facility in the Banks Building which now houses all Kew's wood collections, including those previously held for plant anatomy purposes at the Jodrell Laboratory (Wickens 1993b).

[17] This post had existed since 1927

Geographical source

Accessions from India – which form the subject matter of Chapter Six – are consistently represented in the years up to the First World War, although in 1910 Japanese accessions surpassed Indian ones as a result of the Japan-British Exhibition (Figure 3.8). African accessions in 1870, 1890 and 1910 coincide with the period of the 'scramble for Africa' and the extension of British territorial interests, first in West Africa and then in the East of the continent. Kew collections benefitted twice from such interests: firstly as a result of exploration, and subsequently from settlers and commerce. The presence of Oceania in the data – from whence came the Tasmanian Timber Trophy whose biography is given in Chapter Eight – broadly matches that of India from 1870 to 1890, whereas the dominance of Oceania in the 1970 figures reflects a number of expeditions to Fiji, the Solomon Islands, New Guinea and New Zealand, indicative of increased anthropological and environmental interest in the region at that time.

Donor type

Analysing object accessions by type of donor is problematic insofar as there is a certain 'slippery' quality to the categories: it would be possible to attribute an individual or institution to more than one category at the same time, and additionally donors' circumstances changed, often through the course of 'imperial careering' (Lambert & Lester 2006). John Kirk, for example, is entered in the category of 'botanists' for donations received in 1857, 'expeditions' for donations received during his time on the Zambezi Expedition 1858-1863, and from 1867-1887 under 'government departments', in his position as Vice Consul and Consul General in Zanzibar. Throughout I have tried to avoid the use of the catch-all term 'collector' since this is often applied to a variety of individuals ranging from colonial residents who did not derive the greater part of their livelihood from botany, to commercial collectors

commissioned by Kew such as Richard Spruce, and botanists engaged on official voyages of exploration, like the aforementioned Kirk. Rather, in devising these categories I have been keen to expose the types of networks practised by Kew (Figure 3.9).

'Botanists' includes a number of sub-categories, including academics, and amateurs such as missionaries and doctors who were among the few with access to botany lectures; 'Growers' comprises land-owning foresters and gardeners, often from the aristocratic class (but also in state forests), their land-agents and gardeners; 'Planters' refers to plantation owners, nurserymen, and farmers, whilst 'Government Departments' covers colonial officials as well as governments in the post-colonial era. This is a diverse group ranging from the Foreign Office and the Diplomatic Service, the Colonial and India Offices, to the Science and Art Department (DSA), and Ministry of Agriculture.

A number of events or trends are suggested by the data. In 1850, for example, the high number of accessions sourced from expeditions reflects Richard Spruce's voyages of exploration in the Amazon Basin and the Andes. By 1870 there are signs of a growing awareness amongst traders and manufacturers of the services offered by the Kew Museum, a fulfilment of the original target audiences of 'the merchant, [and] the manufacturer,' (Hooker 1855, 3). Botanical gardens, too, formed a significant proportion of donors in this year, involving not only transfers of material within Kew, but equally from the network of colonial botanic gardens.[18] Under the directorship of Thiselton-Dyer from 1885 to 1905, Kew shored up its connections with the Colonial, India, and Foreign Offices, and the 1890 figures reflect the increased 'dependency' of these government departments on Kew's expertise (Desmond

[18] TNA PRO WORK 6/297 *Report of Committee on Expenditure and Management of the Royal Gardens. Vol.1.*

2007, 260). Ten years later, in 1910, traders and manufacturers continued to constitute a significant segment of Kew's donor profile but the statistics also reflect two principal events of that year: the opening of the British Forestry Museum at Kew and the Japan-British Exhibition. The pattern for 1930 reflects the rise of other research institutes, in particular the Imperial Institute, and the injection of funding at Kew from the Empire Marketing Board. In 1970 botanical expeditions organised by Kew and other institutions became a key medium of collection-building, and objects were usually accessioned into the Collection via the Herbarium, which now acted as the initial entry point for this sort of material. The 1991 peak represents internal transfers from the Herbarium and Jodrell Laboratory.

Object type

Raw materials in the Collection may exist as natural history specimens or in a semi-processed condition, for example as vegetable oils. In order to gain a clearer understanding of the importance of woods to the Collection, raw materials data were divided into woods and 'other' – typical examples of objects in this category are plant fibres, seeds, and leaves. Woods currently account for approximately one third of the collection, totalling around 30,000 objects. They formed the basis of two of the Museums: Museum No. 3 (Timber) opened in 1863, and Museum No. 4 (British Forestry) opened in 1910. And wood exhibits were also included in the 'systematic' displays of Museum Nos. 1 and 2, ensuring a presence for woods across the Kew museum complex. Almost from the beginning, therefore, wood specimens constituted a significant proportion of accessions. Since wood items were often donated as part of large collections, the data here – based on accession events, not individual items – significantly under-represent the actual number of wood specimens received. In 1850, two donations in particular are noteworthy: 142 wood specimens from

the aptly-named Lieutenant Wood of the Royal Navy, and 200 from the Duke of Northumberland.[19]

The wood collections experienced another surge in 1910, the year of the opening of the British Forestry Museum at Kew and by now the donor base amongst aristocratic estate owners was much broader, including the Earls of Wharncliffe, Darnley, and Derby, and extending to King George V, who donated a wood specimen from the Sandringham Estate. In more recent times, wood acquisitions have been characterised by internal transfers from other Kew departments, including the wood collections from the Jodrell Laboratory. Notable amongst these is the transfer of forty-three wood specimens from the 1987 storm which wreaked extensive damage on the living plants collection at Kew.

'Other raw materials' constituted a consistently well-represented category in the years to 1970, receiving a significant boost from the 'fall-out' of the 1910 Japan-British Exhibition at Shepherd's Bush (J-BE 1911). 'Artefact' refers to man-made objects of the kind usually considered as ethnographic, and 'manufacture' refers to either machine-made objects or examples of materials at various stages of processing, known as 'illustrative series'. The cricket bat cited above is typical of this category. Illustrative series were often supplied by manufacturing companies; in 1870 the chocolate manufacturers J. S. Fry & Sons donated a series of cocoa specimens representing the chocolate production process.[20]

[19] RBGK EBC, Museum Entry Book 1847-1855, EBN 1.1850 and EBN 19.1850

[20] RBGK EBC, Museum Entry Book 1861-1879, EBN 1870.40

Selecting case studies

The EBC currently stands at 85,000 objects,[21] the vast majority of which are held in store, beyond the public gaze (Figure 3.4). It is an open collection, growing at a rate of approximately 1,000 objects per year, which contains a variegated assemblage of plant specimens, ethnographic artefacts, craft and manufactured objects, and a variety of interpretative materials including models, photographs, and illustrations. One of the aims of the research has been to account for this variegation and determine how it was used to create scientific knowledge. But the vastness of the collection required a systematic approach to selecting case studies for the thesis.

While a number of objects and sub-collections have already been the subject of published and unpublished research by various historians, the woods have to date been *terra incognita* as the subject of historico-geographical research.[22] Woods have at all times represented a significant percentage of accessions (Figure 3.10). They occur as timber samples (wood raw materials), manufactured items, and ethnographic objects, thus spanning the material breadth, as well as the temporal length of the Collection. As the research project has concentrated on Kew's association with the British imperial project, woods again suggested themselves as apt objects of study. The shared history of British territorial expansion and timber consumption is almost as old as colonialism itself. As Adam Bowett relates, it was naval expansion in the 1650s which led to the sourcing of timbers for British ships from the colonies in North America and the Caribbean (Bowett 2012, xii); later, St. Helena, and the Cape Colony were denuded of their natural forests for the purposes of maintaining British naval and mercantile fleets. It was as the same pattern of

[21] RBGK website: http://www.kew.org/collections/plant-artefacts/index.htm, accessed 13 June 2012.

[22] I exclude here Adam Bowett's book (Bowett 2012) as this is a materials history of a class of objects, i.e. furniture woods, rather than a cultural biography of particular specimens.

deforestation was emerging in India, that Governor-General Lord Dalhousie, in part inspired by his communications with Joseph Hooker, introduced state conservationism to the sub-continent in 1855 (Grove 1995, 453-473). The Kew Museum had collected woods from its earliest days; however, Kew now became, through Dalhousie and the Imperial Forest Department he established in 1864, not only a repository of woods representing the colonial forestry conservancy project, but an active collaborator in it through the development of plantations, texts, and forestry professionals.

In the light of their significance in the making and development of the Collection, it was therefore decided to focus the research on woods and wooden artefacts as being sufficiently representative of the Collection and of the Museum, yet sufficiently distinctive to yield new knowledge. Beyond this, pictorial and textual evidence of objects *in museo* was considered necessary to the evaluation of the display strategies adopted and to understandings of how the displays may have been received by contemporary audiences. There was also a desire to achieve a breadth of geographical provenance; India, Canada, and Australia are the three former colonial territories which figure in the object biographies for a number of reasons, not least of which is the floral diversity that they represent. Their histories, too, are diverse, and, in addition, they are consistently represented in the history of the Collection. Ultimately, though, it is what the objects could demonstrate about ways in which knowledge was produced in the Museums, which set the seal on their inclusion in the thesis.

Temporal span

Object biographies, by definition, trace the lives of objects from inception (or even conception) to their present-day locus, excavating the values they accrue along the way. Chapter Seven presents an example of this approach, concluding with the 2011 account of a current practitioner of totem pole carving

in British Columbia who offers a new interpretation of the pole which originally came to the Museum of Economic Botany in 1898 and now resides in the BM. Section II of the thesis, however, which focuses on practices, has a somewhat more restricted temporal focus beginning with Kew's transition to public ownership in 1840; covering the opening of the four Museums in 1847, 1857, 1863 and 1910; and ending at the First World War. Overall, this section presents an account of the Kew Museums in the context of 'public' Kew over the long nineteenth century (for the directors of Kew during this period see Appendix II).

The British Empire reached its territorial peak after the Treaty of Versailles in 1919 (Beckett 2007, 564). Kew's ability to conduct economic botany research during the inter-war period was somewhat compromised by the continuing rise of the Imperial Institute whose laboratory had first opened in 1896. Kew did, however, receive a grant from the Empire Marketing Board in 1927 for a quarantine house and an economic botanist (Wickens 1993b, 132) but with the advent of new agencies at home and abroad, such as the Imperial College of Tropical Agriculture in Trinidad in 1922, and the Colonial Agricultural Service in London in 1935, Kew's pre-eminence was gradually eroded along with its ability to build a museum collection.

4. Thesis framework and structure

Theoretically speaking, the thesis draws on three strands of thought to create an historical geography which is both original and tailored to the task of reconstructing the life and times of the Museum through its practices and objects. On the one hand, it is informed by geographical notions of scientific knowledge as spatially contingent at the level of the site, the region, and in circulation (Livingstone 2003). This strand is particularly evident in Section Two which deals with museum practices. The focus on Lindley's three sets of

practices here is more than a mere structuring device for the thesis; it is a critical examination of Kew's strategic mission in the initial decades of its life as a public entity. And specifically, it is an analysis of the ways in which knowledge was produced in and beyond the Kew Museums through the practices of display, education, and circulation. By studying the traces of these practices in objects, images, and texts, the roles played by curators, donors, and merchants begin to emerge, and the collaborative nature of the Museum becomes evident. Furthermore, it is in studying these practices that the 'how' of knowledge production in the Kew Museums has come to light.

The second theoretical strand relates to notions of networks and agency, influenced by the writings of Latour and others on the historical geographies of science, and is particularly evident in the third part of the thesis. This part focuses in detail on the lives of museum objects and through them explores institutional networks and the agency of people and things. The outcome of building, extending, and maintaining networks at Kew was the ability to act at a distance – in the case of the Kew Museum the ability to mobilise and accumulate a metropolitan museum collection and thence to construct the discipline of economic botany. However, since our stated object in this thesis is to demonstrate the multiple forces involved in the process of constructing and re-constructing the Kew Museum over time and space, there is a danger that the Latourian concept of networks converging on 'centres of calculation' could result in a wholly Kew-centred study.

The methodology of object biography constitutes the third theoretical strand and is designed to avoid this pitfall. In following the lives of things, we can examine the processes of negotiation and exchange which go to build a museum collection and delineate the networks through which knowledge is produced, in the process revealing the spatial and temporal contingencies of value. A focus on objects is a logical choice for a museum-based study since it is through

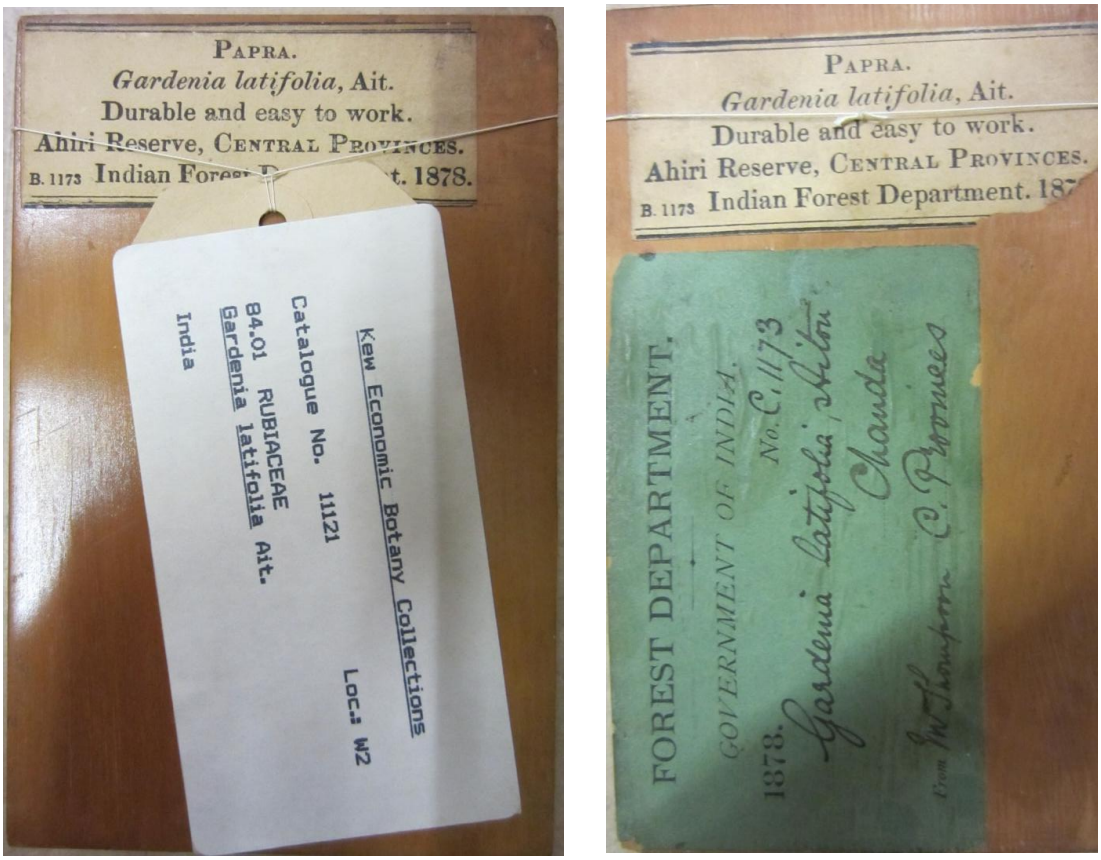
objects that lessons are taught, memories are evoked, imaginaries are created, and scientific knowledge is produced in museums.

The three strands which compose this compound approach are also reflected in the structure of the thesis. Part One sets the context, with the first chapter providing an historical account of the Museum and the development of economic botany in the long nineteenth century. Chapter Two reviewed the literatures central to the research process, and this chapter has provided a rationale for the sources, methods, and case studies selected, and an indication of how they will be deployed to answer the questions posed by the research project: how did the Kew Museum produce scientific knowledge in the long nineteenth century? And what did the Museum contribute to the field of economic botany?

Part Two concerns museum practices. Chapter Four – 'Exhibition' – is focussed on the museum space, the venue of the economic botany discussed in the thesis. Chapter Five – 'Instruction' – in its attendance to spaces beyond the Kew Museum such as the Jodrell Laboratory, the Gardeners' Library, schools, and other museums, concerns the regions in which the Kew Museum existed, constituted in terms of the immediate vicinity of the Gardens, the metropolis, the United Kingdom prior to 1914, and the British Empire. Finally, Chapter Six – 'Supply' – follows the circulation of objects and other forms of knowledge around nineteenth-century circuits of collection and display.

Part Three treats specific objects and their biographies to elucidate the extent and nature of the Kew Museum's networks across the British Empire, and to delve more deeply into the processes of knowledge production and meaning-making. Chapters Seven and Eight trace the production, circulation and reception of a totem pole from British Columbia and a timber trophy from Tasmania respectively, the former demonstrating how sites confer meaning on

objects, and the latter how objects can be used to impart meaning to sites. In conclusion, Chapter Nine reflects on the legacy of the Museum of Economic Botany and the cumulative findings and outcomes of the thesis, both actual and potential. It considers those questions raised by the research and looks beyond the thesis to recommend areas for future research and practice.



Figures 3.1-3.3 EBC 11121 *Gardenia latifolia* Ait.

Showing (clockwise from top left): polished surface, unpolished surface and stamped figures.

Figure 3.4 Woods in the Economic Botany Collection Store, Sir Joseph Banks Building

Photograph by A. McRobb 1989; KPI X-89-92 ©RBG, Kew

Figure 3.5 Botany Gallery, Indian Museum, Kolkata (formerly known as 'Industrial Section')

Image reproduced courtesy of the Indian Museum

Figure 3.6 Museum of Non-Wood Forest Products, Forestry Research Institute, Dehradun (formerly known as the Imperial Forestry Institute)

Image reproduced courtesy of the FRI

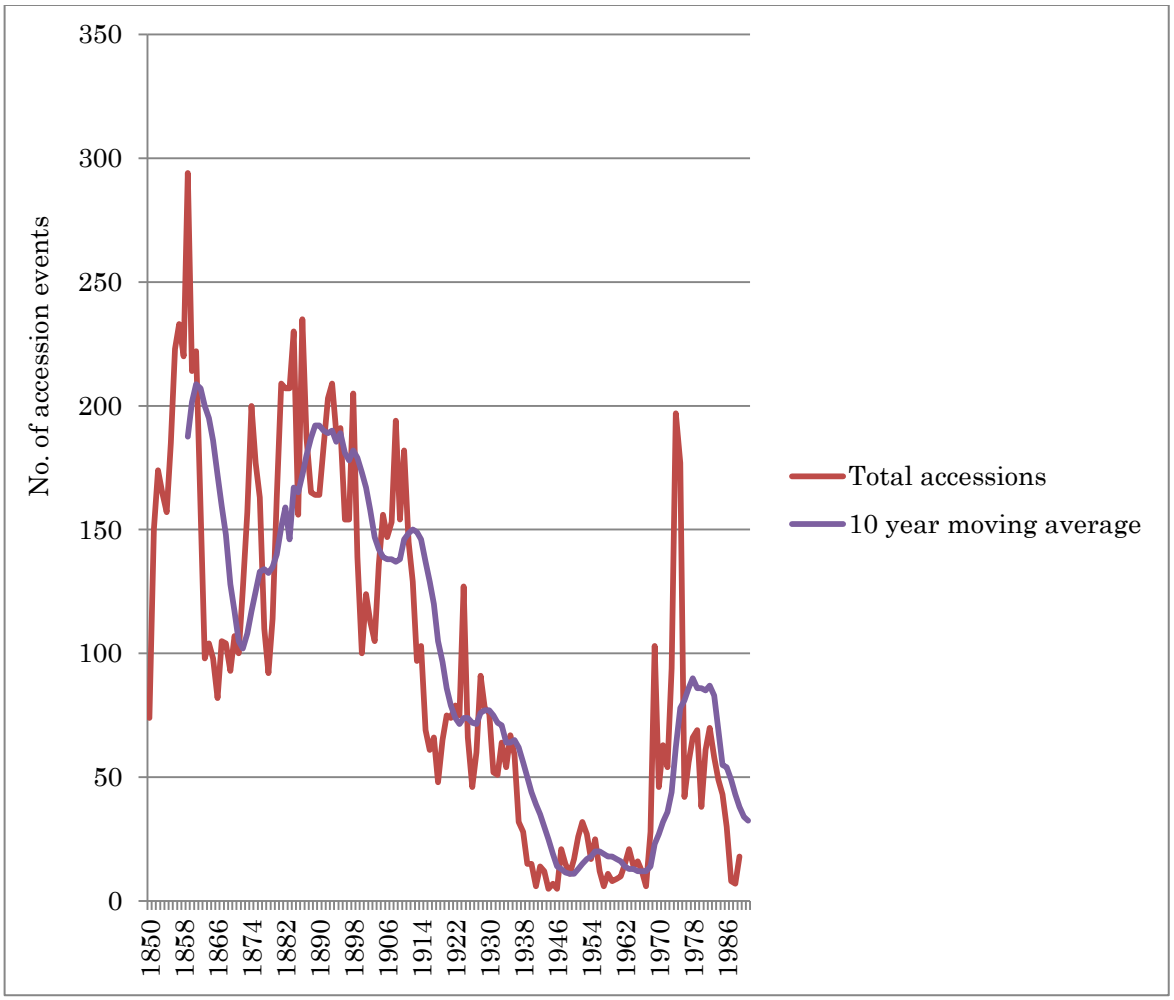


Figure 3.7 Analysis of accessions 1850-1991

Note: data for Figures 3.7-3.10 indicate the number of accession events, not the number of objects accessioned, therefore they are a measure of the frequency of accessioning activity

Source: RBGK, EBC Entry Books

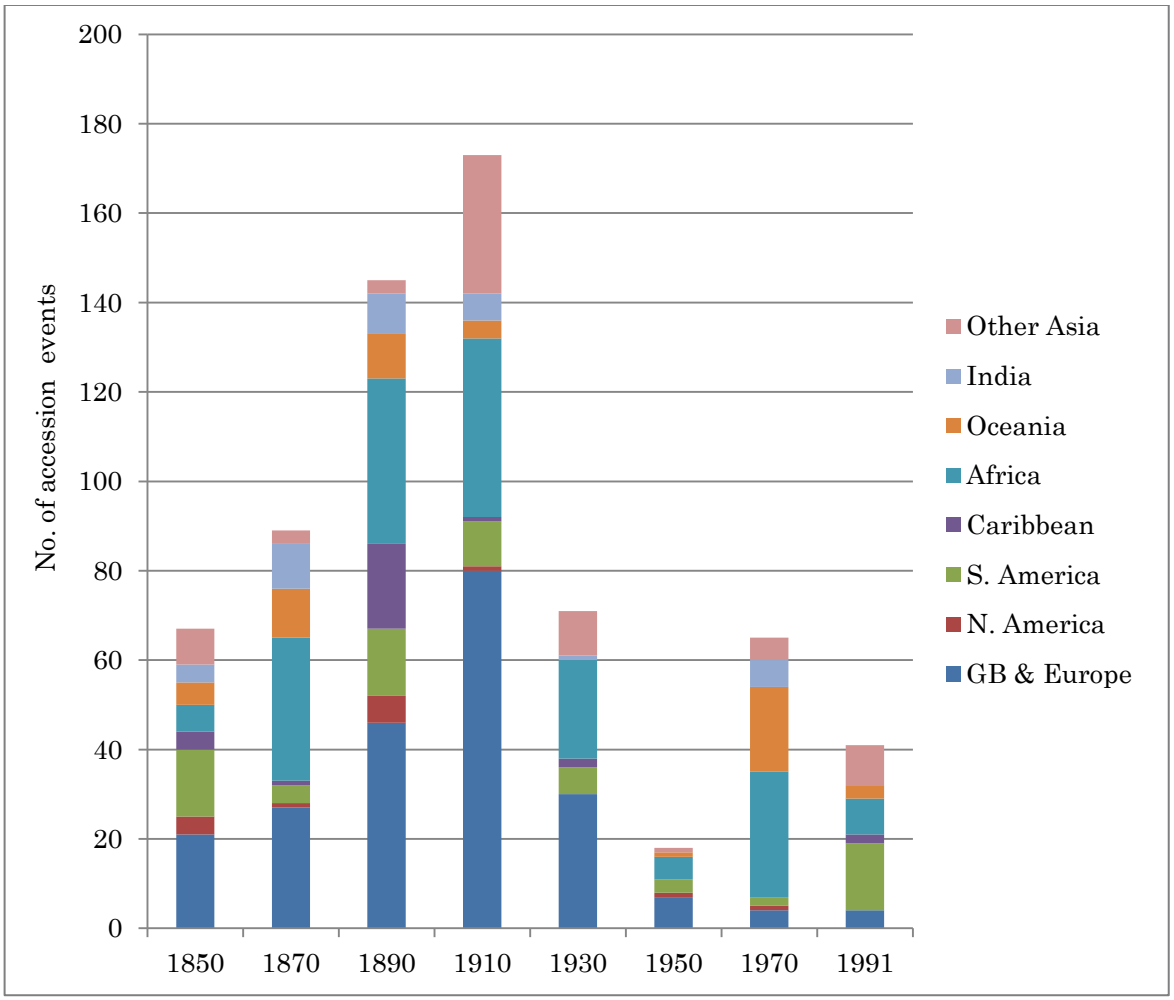


Figure 3.8 Accessions by geographical source at twenty-year intervals

Note: the data includes only those accession events for which the provenance of objects is known (94.4% of accessions over the eight years shown)

Source: RBGK, EBC Entry Books

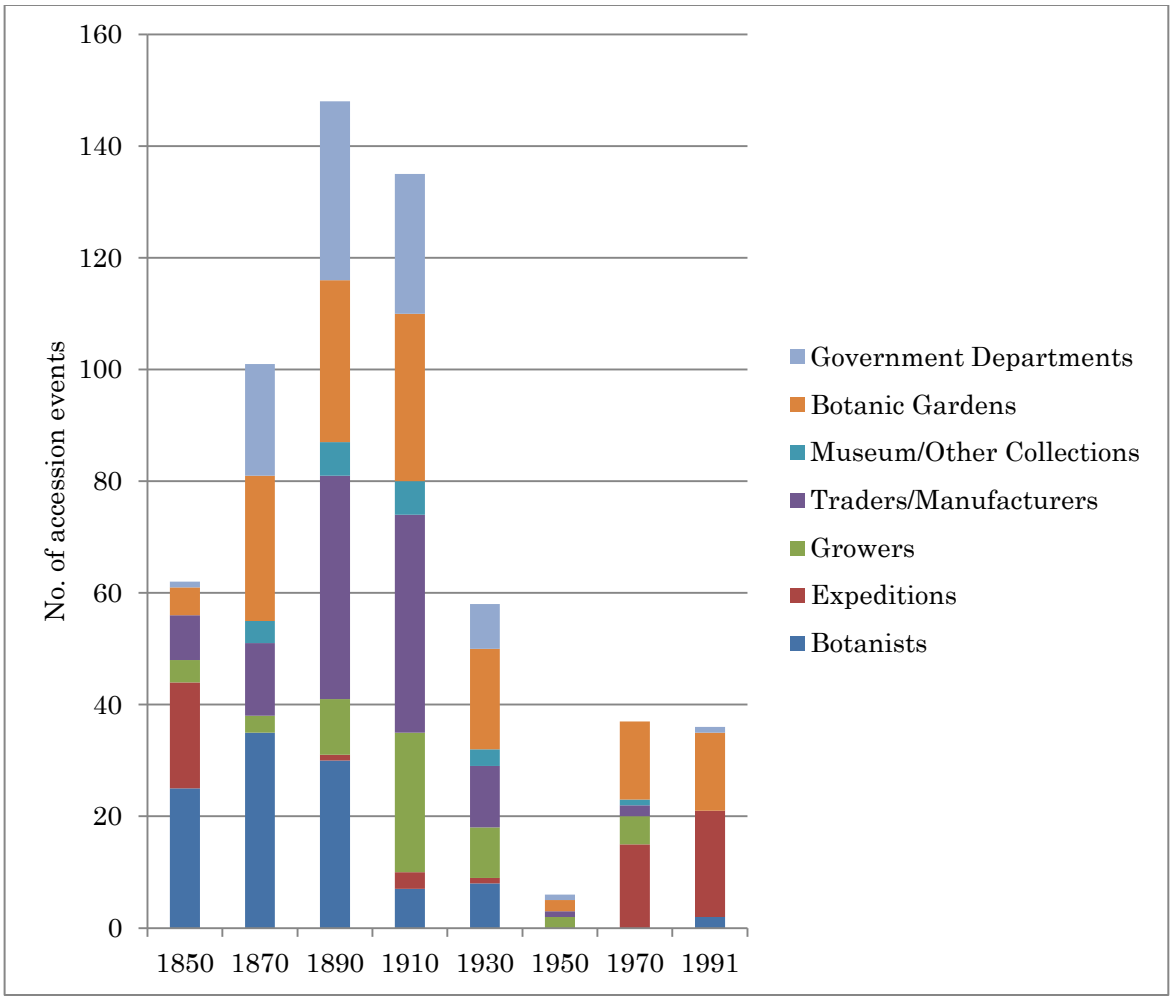


Figure 3.9 Accessions by type of donor at twenty-year intervals

Note: the data includes only those accession events for which the type of donor can be established (90.7% of accessions over the eight years shown).

Source: RBGK, EBC Entry Books

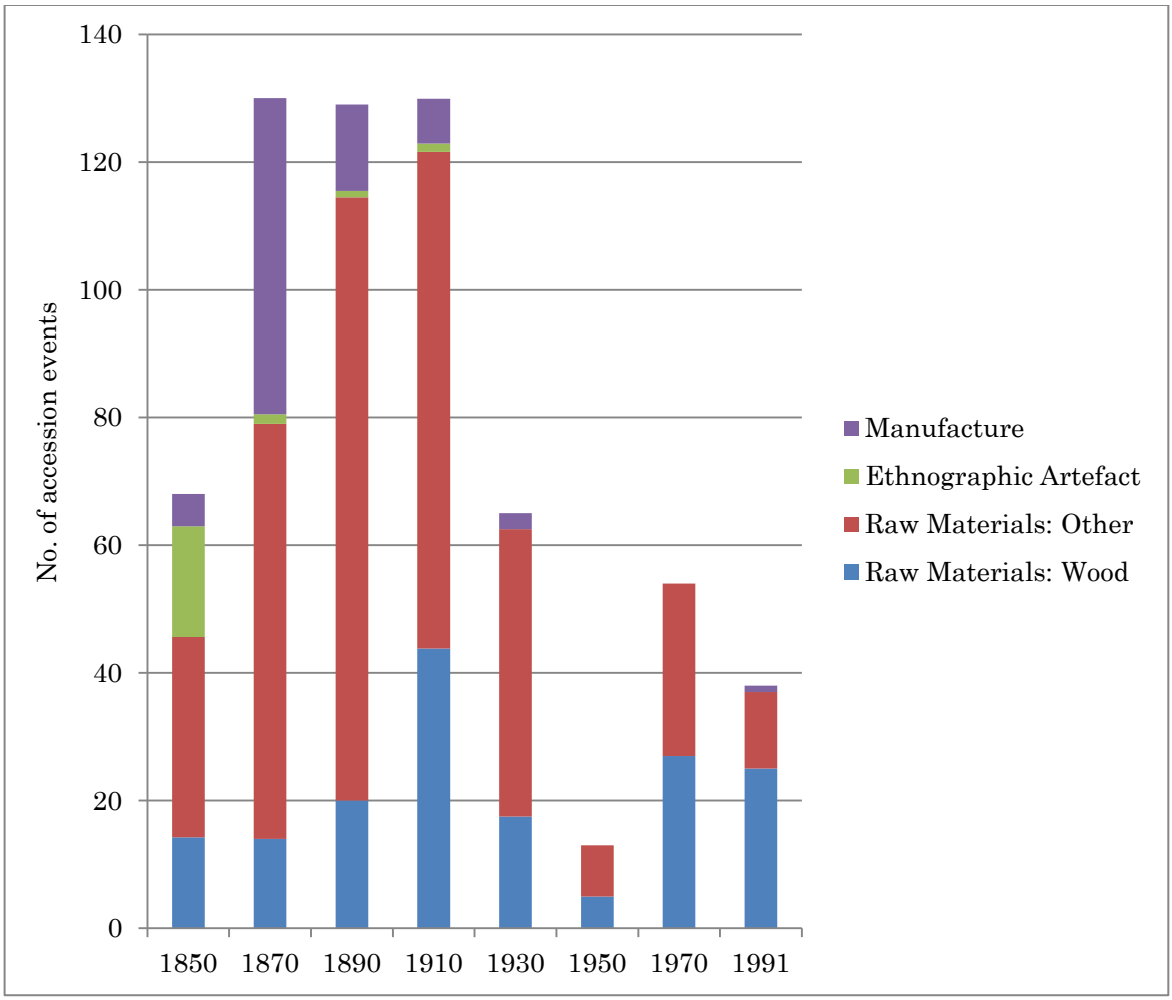


Figure 3.10 Accessions by type of object at twenty-year intervals

Note: the data includes only those accession events in which the type of object falls clearly into one of the categories shown (approximately 84 % of total events).

Source: RBGK, EBC Entry Books

PART TWO

Practices

CHAPTER FOUR

‘Exhibition’

Case 67

In 1902 botanist Johannes Paulus Lotsy, who was visiting Kew from the Hortus Botanicus of Leiden, was sufficiently intrigued by Case 67 in Museum No. 2 to capture it on camera (Figure 4.1). That Lotsy was drawn to the palm species displayed in it is indicated by his careful labelling on the mount, but the wide angle he assumed, incorporating the complete breadth of the cabinet, suggests that he found the composition of the museum display of equal interest. The case was distinguished from its neighbours by the number affixed to its front, denoting its positionality within the systematic arrangement in Museums 1 and 2. By 1902 the Kew Museum had adopted the Bentham-Hooker system (Bentham & Hooker 1862-83) to classify and display specimens. Objects were grouped by ‘natural orders’ which were ‘based upon the amount of similarity, chiefly in the form and arrangement of the parts of their flower and seeds’ (RBGK 1883, 4). Case 67 formed part of a series dedicated to Order CLXXXVII: Palmæ, and could be found in the corridor adjacent to the central exhibition area (Figures 4.2 and 4.3).

The male and female spadices which dominated the space of the cabinet, along with numerous jars of fruits, were described in the *Official Guide* of 1895 as follows:

> **Case 67**
>
> **No. 140** Male and female spadices and spathes of the KOKERITE PALM, *Maximiliana martiana,* Karst. (M. Regia, *Mart.*) from Demerara. This magnificent palm forms a lofty smooth trunk, covered with large, terminal pinnate leaves, sometimes 50 ft. long; the petioles are persistent for some distance down the trunk. The palm produces numerous spadices from amongst the bases of the lower leaves. The spathes which enclose the spadices grow to a very large size, as may be seen from the specimens exhibited. This palm is abundant from Para to the Upper Amazon, and the sources of the Rio Negro. The fruits, of which specimens are shown, are somewhat oval-shaped, covered with a brown outer skin which encloses a fleshy pulp said to have a pleasant sub-acid flavour; in the centre is a hard, bony seed.
>
> Observe photographs of KOKERITE palms, from Maccaseema, British Guiana.
>
> Note also in the lower portion of the Case, rough and finished PARTRIDGE CANES, the stems of an unknown palm largely imported from China, for making walking sticks and ladies' sunshade handles.
>
> A few palm products, the exact sources of which cannot as yet be determined, are shown in the bottom of this Case and on the top shelf of Case 68 (RBGK 1895, 52-53).

This passage is of particular interest, as it represents a conscious attempt to explain the organising principle behind the case's multifarious contents. The plant is represented by both inflorescences and fruits; it is supported by photographs showing the living plant in its biogeographical context; and below it are specimens from the same order, albeit species unknown, displayed in the very process of being transformed from raw material into manufacture – from rough cane to walking stick and sunshade handle.

An illustration from *Curtis's Botanical Magazine,* visible on the left of the image (Figure 4.4), was added to the case in 1897, as was a smaller pair of spadices from plants grown at Kew, positioned to the right of the illustration. The article from which the latter was taken is one in which Joseph Hooker renamed the species *Scheelea kewensis* (RBGK 1897, 947-49) and together these objects tell a story of botanical knowledge as mutable and contested. But if the display produces knowledge in part by claiming botanical authority, it also looks to the world beyond the case to add to that body of knowledge. Here, too, are palms which are 'unknown' and which 'cannot as yet be determined', signifying an absence of knowledge. As early as the 1861 *Official Guide*, Daniel Oliver had requested that 'any suggestion bearing upon these [labels], or hints respecting our deficiencies, those who have the charge of this important branch of the Kew establishment will be most happy to receive. Such should be addressed in writing to the Curator of the Museums, or the Director of the Gardens' (Oliver 1861, 3-4). Furthermore, the systematic display adopted in Museums 1 and 2 exposed those areas under-represented in the collection in the most spatial of ways – by gaps. Prior to Oliver's appeal, William Hooker had broadcast the following in the first museum guide:

> We avow another object, besides giving instruction, viz. that of showing our deficiencies, and affording our readers the opportunity, which many will gladly embrace, of contributing numerous objects (Hooker 1855, 7).

Even by the end of the century there was no sense that the knowledge made and displayed in the Kew Museums was complete. By 1891 curator John Reader Jackson was able to declare with no discernible discomfort: 'museums should show us, not only how much, but also how little, we yet know of the world and its products' (Jackson 1891, 121). As Dixon had observed in 1856, the displays in the Kew Museums appeared as spaces of knowledge exchange, and as dynamic sites of knowledge production.

With its designated location in a systematic arrangement, its juxtaposition of nature and culture, and its use of interpretative aids to provide an interpretative framework and to confer scientific legitimacy, Case 67 figures synecdochically for the display strategies adopted in the Kew Museums. In this chapter I examine the ways in which knowledge was produced from such a formula and how a scientific discipline was built. Museums use objects primarily to represent ideas, but language and data were also developed and deployed for particular ends in the Kew Museum.

My argument in this thesis is that the Museum of Economic Botany preceded a range of institutions, including universities, in rendering economic botany an educational subject – in short, in creating of it a discipline – in the mid-nineteenth century. It did so in part by calling on a variety of exhibitionary traditions, and by the transference of techniques from the educational, commercial, and domestic spheres, drawing all of these together in innovative combinations in the museum space. Exhibition practices are the subject of this chapter. I begin with the uses and effects of the spatial disposition of buildings, cases, and objects (Section 1). I then turn to the particular combination of interpretative devices deployed at Kew and consider how these functioned to produce scientific knowledge (Section 2). A third section re-constructs the biography of such a device – a model of an indigo factory – and by examining the conditions surrounding its production, circulation, and reception, the spatial contingency of meaning becomes clearer. I conclude by considering the specificity of the Kew Museums and the rationality of economic botany as expressed in the Museums' displays.

1. Spatialities of display

Architecture

There was no architectural unity between the four museum buildings at Kew: a former fruit store; a purpose-built museum in an unexceptional style; Princess Augusta's former orangery; and a former royal 'cottage' (see Appendix I). Here there were no monumental staircases leading to neo-imperial façades (Duncan & Wallach 2004, 66), nor any of 'nature's cathedrals' (Livingstone 2003, 38). These buildings were not consciously constructed as secular temples, and the 'civilising ritual' model which has been applied to much museum architecture of the period does not fit comfortably the Kew Museums (Duncan 1995). Furthermore, as Carla Yanni reminds us, museum architecture can suggest a particular view but it cannot determine meaning (Yanni 1999, 11). Rather than consider an iconographic master-narrative for the Museums' architecture therefore, it appears more appropriate to focus on the material and spatial aspects of the museum buildings and on how these may have contributed to knowledge production and to constructing economic botany as a discipline.

It seems unlikely that the top lighting and iron gallery which Decimus Burton incorporated into the first Museum of Economic Botany was intended primarily as a disciplinary mechanism, rendering the visitor 'the object of an unknown but controlling look' (Bennett 1995, 69). Burton's task as architect had been to convert a former fruit store into a display space. The building, with its purposeful lack of window lighting, had now to be flooded with light (Figures 1.4 & 1.5). The repeal of excise duties on glass in 1845 (Shteir 1996, 152) and recent developments in the manufacture of sheet glass made top-lighting the obvious solution to illuminate the fledgling collection; similarly the new affordability of cast iron made possible the inclusion of a balcony and the display of an additional storey of objects (Yanni 1999, 9; 107).

Whatever its success in rendering objects and people more visible, the design of the first Museum was not repeated in any of the subsequent ones. The second Museum, opened in 1857, was Burton's only purpose-built museum design at Kew. Museum No. 1, as it immediately became known, consisted of three storeys of side-lit space, creating an area that was 'lightsome, and so spacious as to permit the objects to be arranged both systematically and instructively' (Hooker 1858, 3) (Figure 4.5). By this time, the collection was growing at such a rate that an atrium must have appeared an unaffordable luxury.[1] The internal arrangement of display cases followed a library layout with projecting bays; this, too, was a device for increasing display capacity but also functioned to sub-divide the taxonomic system, in a way akin to the chapters of a book (Forgan 1994, 148). As in the first Museum (now named Museum No. 2), a sequential numbering system indicated the 'correct' way to view the arrangement in order for the visitor to internalise the taxonomy. Sophie Forgan alerts us to the fact that nineteenth-century museums were about 'modern objects, the latest instruments, the newest methods of manufacture...such museums were at the forefront of knowledge' (Forgan 1994, 140). Furthermore, Suzanne MacLeod argues that exhibitions housed in modern, purpose-built museums suggest to visitors that the displays they are viewing are similarly modern and represent a challenge to tradition (cited in Moser 2010, 24). If we view the newly-built Museum No. 1 through these lenses, we begin to see it as contemporary visitors may have seen and understood it, and how the newness of the building, combined with its novel modes of display, helped to shape economic botany as a most modern branch of science.

Museum No. 3, the former orangery designed by William Chambers and completed in 1761, is arguably the most imposing of all the former museum

[1] 'We have now applied to the Crown for an entirely new structure, suited to the increased and continually increasing collection.' (Hooker 1855, 4)

buildings. Its dimensions signal its importance, and this is reinforced by the arms of Princess Augusta and the royal arms emblazoned on its façade. The building is classically inspired in its proportions and architectural details but this is no slavish tribute to Classical architecture, rather a playful re-interpretation in an Arcadian setting. Royal connections may equally have intrigued visitors to Museum No. 4, a former residence of the Duke of Cambridge which was ceded to the Kew estate in 1904. Architecturally, however, Cambridge Cottage is a two-storey building of modest proportions, presenting itself as a set of discrete rooms which were utilised to represent a series of themes in the new Museum of British Forestry.

The four museum buildings were distributed broadly across the northern half of the Gardens. With such architectural diversity and breadth of spatial disposition, was it possible that the Kew Museums were considered by visitors as a single entity, a museum complex? Guide-books, both commercial and official, included maps which gave their relative locations (Figure 4.6), and the official museum guides gave directions to the other Museums whilst also trying to emphasise the unity of the display scheme:

> In dividing the extensive arranged collections between the two museum buildings, advantage has been taken of the two grand classes into which flowering plants are found to be grouped in nature. One of these great classes occupies Museum No. I. The other class…[is] retained in Museum No. II. (Oliver 1861, 3)

Ultimately, though, it was the spatial context of the Royal Botanic Gardens which gave the four disparate buildings a sense of unity. A Kew Museum had to be 'worthy alike of the noble gardens of which it is a part, and of the Nation' (Hooker 1855, 4) and it was the unifying narrative of science, empire, and the public good that imbued them with the requisite worthiness.

Systematic displays

> Every thing should be systematically named and arranged
>
> Lindley 1840 [2]

Although Lindley's recommendation referred to botanical systematics or taxonomy, it can be taken as symptomatic of a broader museological concern over the course of the nineteenth century, that of displaying collections to represent particular theories in spatial terms. An oft-cited example is Pitt Rivers' concept of the typological display – one which in its very arrangement of human artefacts from 'primitive' to 'civilised', sought to lay before the viewer Pitt Rivers' own notion of evolution, namely that material culture, like plant and animal species, was subject to rules of 'natural' selection. The display appeared to offer a means of communicating this somewhat complex notion to illiterate and semi-literate audiences.

At Kew in 1847 William Hooker and John Stevens Henslow had initially adopted a 'commercial' arrangement of the collection in the first Museum of Economic Botany, grouping exhibits into the categories of: '1. Fibres or textiles; 2. Gums and Resins; 3. Dye-stuffs; 4. Starches; 5. Oils; 6. Woods; 7. Tannins; 8. Drugs; 9. Food for man; 10. Basket-Work; etc.' (Hooker 1855, 5) However, two factors militated against this, one botanical, the other spatial. The key spatial implication of a commercial arrangement was that certain plants were displayed repeatedly under different categories. A species which might be useful for its wood, its bark, its leaves and its fruit, could thus appear under timbers, dye-stuffs, drugs, fibres, and so on. Furthermore, Hooker believed that a commercial arrangement gave no idea of the *kinds* of plants yielding particular substances or with particular properties. In a systematic arrangement, however, it became clear that:

[2] 1840 (292) *Botanical Garden (Kew). Copy of the Report made to the Committee appointed by the Lords of the Treasury in January 1838 to inquire into the Management, &c. of the Royal Gardens at Kew*, p. 5

> the *Ranunculus*-, or *Crow-foot* Family contains acrid and poisonous principles: the *Poppy-family* is narcotic, while the seeds are wholesome: the *Sour-sop-family* supplies excellent fruits: the *Cruciferae* are antiscorbutic, while the *Violet-family* is emetic (Hooker 1855, 6).

Armed with a knowledge of plant families and their properties, Hooker argued that 'the intelligent traveller may safely estimate the properties with which a plant, though he has never seen it before, may possess' (1855, 6). In particular, botanists accompanying expeditions would thus be well-placed to identify sources of food, medicine, and so forth in new and unfamiliar environments. The specificity of this claim in the first official museum guide forcefully aligned Kew with the British imperial project and indicates the popular appeal and extent of exploration and discovery in nineteenth-century Britain. It also demonstrates an aspect of the process by which economic botany was formed into a scientific discipline in the Museum: by arranging economic botany over a systematic framework, Hooker was making visible truths or observed facts, bringing them under general laws (correlating between plant properties and taxonomic family), and providing a trustworthy method for the discovery of new truths by the 'intelligent traveller'.

The systematic arrangement initially adopted in the Museum was Candolle's 'natural' system (Candolle 1852). In choosing this system, Hooker was aligning himself with academia at the expense of amateur botany, which favoured the sexual system of Linnaeus. This, too, was a discipline-defining act since it provided a shared language between the Museum and the academy, in particular London University, the avant-garde of academic botany. The museum cases were numbered, so to view them sequentially was to perform Candolle's system; now the learning process became embodied as visitors progressed through the displays. Hooker considered this plan to reconcile the requirements of science and commerce; it was both 'systematic and instructive'

(Hooker 1855, 3). Furthermore, the museum visitor received 'twofold gratification and twofold instruction' (1855, 4), since in Kew's gardens and hothouses 'he' could also see the living plants of many of the species represented in the Museum. This multiple approach was unique to Kew amongst metropolitan museums, and placed Kew in a strong position to form economic botany into a discipline.

In 1857 Candolle's system was extended to Museum No. 1, so by 1863, with the opening of Museum 3 (Timbers), Hooker opted to reflect the geographic principle employed in the 1862 London International Exhibition from which the majority of the exhibits had been acquired. Specimens were 'arranged in groups according to the countries producing them, and not with any attempt at scientific classification, as in the other Museums' (Oliver 1866, 78). The founding collections of Museum No. 3 mapped a somewhat distorted geography onto the museum space (Figure 8.9). This only intensified with the opening of Museum 4 (British Forestry) in 1910, which separated off the British specimens, leaving Museum 3 as a repository of colonial timbers. Museum 4 had its own, more thematic layout which reflected the differing needs of forestry practitioners and scientists and was a reaction to concerns regarding the needs of diverse museum audiences.

Display versus research

Increasingly during the last quarter of the nineteenth century, there was a sense among museum professionals that the needs of the new museum-going general public were at odds with those of other museum user-groups. The issue – and a solution – was famously outlined in William Henry Flower's 'new museum idea' (Flower 1898). In his Presidential Address to the Museums' Association in 1893 Flower recalled John Edward Gray's words on the purposes of the modern museum: ' "first, the diffusion of instruction and rational amusement among the mass of the people, and, secondly, to afford the scientific

student every possible means of examining and studying the specimens of which the museum consists." '[3] Contemporary museums, in trying to serve both audiences through a singular display approach, were failing to satisfy either. Public displays, prescribed Flower, needed to be pared down; each object should be displayed to be 'perfectly and distinctly seen, and with a clear space around it'; it must be well-preserved, 'rendering it capable of teaching the lesson it is intended to convey' and this lesson must be conveyed via the medium of the museum label. Above all, there were to be no duplicates on display; these were to be formed into reference collections held elsewhere in the museum.

Flower had visited what he considered to be exemplary museums in Europe and he was particularly struck by Vienna's Natural History Museum which, without doubt, provided the inspiration for his own plan for a 'modern' museum (Figure 4.7). The exhibited collection – for the general public – was to front the building in a series of adjacent rooms, with the reserve collections – for the use of researchers – in a parallel suite immediately behind. Beyond these, Flower envisaged working rooms, studies and offices, again situated in close proximity to their corresponding collections, and all interconnected and accessible to museum staff (Flower 1898, 49).

The discourse of public versus research spaces impacted on the Kew Museums, producing a series of responses. Hooker's original target audiences had been diverse enough, ranging from scientists to craftsmen. Later additions were to include student researchers, and artists, whilst 'the industrial class' (Hooker 1872, 2) appeared in Joseph Hooker's 1871 annual report almost as an unanticipated inconvenience. Nonetheless, spatial constraints prevented the possibility of separating out display and reserve collections in Museums 1 and 2 according to the needs of popular and specialist audiences; indeed, there was

[3] Gray had delivered his paper on the subject at the BAAS meeting of 1864 (Gray 1865, 75-86)

no official provision for a collections store until the construction of the Banks Building in the 1980s. In the intervening years, the collections were displayed in the museum cabinets (or transferred elsewhere), resulting in very dense displays. A number of measures were, however, introduced to meet the specific needs of researchers. 'Special Students' could visit the Herbarium, the Laboratory, the Museums and the Gardens to conduct research and to consult Kew officers, with the Director's prior permission. Such students were given access to the Gardens and Museums outside public opening hours, and in the Museums they were allowed to handle the specimens at these times.[4] This temporal zoning was extended to students of forestry from the early 1870s, in response to requests from the Indian Forest Department for graduates of forestry schools to be granted permission to study the Kew collections before leaving for India. Students spent a few weeks systematically examining the wood collections in Museum No. 3. In 1883 some spatial redistribution of the wood collections was undertaken to better serve these needs. The collections had been growing such that Museum No. 3 had become 'inconveniently crowded, and the contents difficult of inspection and confused' (RBGK 1886, 4). In 1883 'two light iron galleries with spiral communicating staircases were erected, and the whole of the timber specimens were carefully selected from, mostly repolished, and arranged in their present approximate geographical order', effectively creating a spatial separation of display and research specimens (Figure 2.1).

This idea of spatial zoning was further developed with the opening of Museum No. 4 (British Forestry) in 1910. The suite of rooms which constituted Cambridge Cottage – the space allocated for the new Museum – lent itself to a series of themed displays aimed at specific audiences. The 1902 Report on

[4] From 1912 weekday opening time was 10 am from mid-May to mid-October; closing time 8 pm or one hour before sunset. In the remaining months opening time was 12 noon. 'Special Students' could visit from 6 am April to October, from 6.30 am March and November, and from 7 am January, February and December (Desmond 2007, 365)

British Forestry had identified three discrete groups with varying training needs: '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.[5] The Museum reflected this by separating out displays of applied botany from more theoretical ones: Rooms 1 and 2 contained timbers, broadly separated into conifers and deciduous species, dried specimens of tree foliage and flowers, and 'photographs of isolated trees, woodland scenery, and the planting of sand dunes' (RBGK 1919, 5); Room 3 was arranged according to the *Genera Plantarum* (Bentham & Hooker 1862-83), 'to assist the *student* rather than the worker of timber' (RBGK 1919, 6);[6] Room 4 was dedicated to burrs and other abnormalities, plant and animal pests, and examples of good and bad grafting; and Room 5 featured the uses of British timbers. Finally, Room 6 consisted of models of machines, photographs of forestry practices, and tools – including some from the Colonies – 'in order that *persons engaged in forest work* may form a better idea of their respective merits when contrasted with better-known articles' (1919, 129).[7]

Although it evidently departed from Flower's museum plan, the Museum of British Forestry reflected various aspects of 'the new museum idea': it avoided the dense, visible storage that had prevailed in the earlier Kew Museums; it targeted a more tightly-defined group of audiences under a specific aspect of economic botany – British forestry – and within this, adopted different display strategies for students and workers of timber; and it had a coherent message concerning the need for scientific forestry practices in Britain.

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[5] 1902 [Cd. 1319] *Committee on British Forestry. Report of the Departmental Committee appointed by the Board of Agriculture to inquire into and report upon British Forestry; with Copy of the Minute appointing the Committee.*

[6] Emphasis added

[7] Emphasis added

Juxtaposition of objects – nature and culture

The juxtaposition of natural history objects and man-made artefacts in museum cabinets recalls the heterogeneous combinations of *naturalia* and *artificialia* in Renaissance cabinets of curiosity. During the Enlightenment, however, with its epistemic emphasis on order and classification, the converse tendency was predominant, 'discriminating on the basis of difference, rather than in joining on the basis of similitude' (Hooper-Greenhill 1992, 15). For the time being at least, no more would specimens and manufactures share the same display space. The return to more composite modes of display in the nineteenth century suggests, therefore, the possibility of an epistemic shift which requires closer examination.

Quite apart from the changes that were taking place in the displays of 'economic' museums, there was a simultaneous development in natural history museums of displaying the material culture of colonised or other 'primitive' peoples as natural history specimens. The effects of this have been discussed by numerous writers (Haraway 1985; Bal 1992; Bennett 1995; Coombes 1994) who have deemed it to imply a narrative of evolution in which those same peoples were invariably depicted on the lower rungs of the evolutionary ladder. Indigenous products were presented as artefacts, rather than as art, not simply because of their adjacency to displays of flora and fauna, but because of their simultaneous exclusion from art museums (Bal 1992, 558).

However, as Gosden and Larson remind us, the boundaries between the 'natural' and the 'cultural' are rarely so clearly defined (Gosden & Larson 2007, 9). Susan Pearce, for example, describes all museum objects – specimens or artefacts – as 'lumps of the physical world' (Pearce 1992, 4). Natural history specimens are selected according to certain museological criteria and detached from their natural context. They are preserved and mounted, or displayed in

jars, before being organised into some kind of relationship with other material (1992, 6). However, the work undertaken to render them 'true-to-nature' is often concealed; names of taxidermists, for example, are rarely included on museum labels (Alberti 2008). Nevertheless, they are as much artefacts as the baskets, weapons, and so on with which they share the display cabinet.

Ethnographic objects in the Kew Museums were undoubtedly positioned as artefacts,[8] as examples of the usages of plant raw materials, but so were *objets d'art* and goods manufactured by British companies.[9] A key difference was that art and manufactured objects bore the name of the maker whilst ethnographic ones tended to bear that of the European donor. Ethnographic manufactures were exhibited at Kew as representations of indigenous knowledge of plant uses – 'the uses which the ingenuity of man has derived from them' (Hooker 1855, 4) – particularly when the plants in question were hitherto unknown to British markets. Indeed recording indigenous knowledge can be seen as the first step in evaluating the utility of a 'new' species, followed by the projection forward of other potential usage opportunities. However, these projected opportunities were not supplied in the text of the label. The raw material was accompanied by the manufactured or prepared article only 'to a certain extent' (Hooker 1855, 3). New applications were to suggest themselves to manufacturers from the juxtaposition of raw materials and finished goods, revealing once again the interactivity of the museum displays. The presence therefore, of the material culture of indigenous peoples in the Museums of Economic Botany signalled two distinct yet interconnected ideas: that the colonies were a virtually limitless source of raw materials – both plants and humans – for British industry; and that indigenous practices

[8] The EBC is still referred to internally at Kew as 'plant artefacts' to distinguish its contents from the Herbarium collections. See http://www.kew.org/collections/plant-artefacts/index.htm

[9] Again, the term is a Kew one: the *objets d'art* collection is now under the custodianship of the Herbarium, Library, Art and Archives (HLAA) department at Kew.

provided the key to tapping such resources. To cite Richard Drayton, the Museums offered 'a portrait of Providence' (2000, 196).

2. Rhetorics of display

> Q: Will you describe the nature and extent of the Museum at Kew?
>
> A: Of museums proper...there are three; they were designed primarily to demonstrate to the public the uses to which plants are put, by exhibiting specimens that illustrate useful plants, maps showing their distribution, diagrams showing their structure, and specimens of the products which they afford.
>
> James Kay-Shuttleworth to Joseph Hooker 1871 [10]

Insofar as museum interpretation, in the form of text, diagrams, maps and other devices, aims to persuade the museum visitor of a particular viewpoint – here, 'the uses to which plants are put' – it can be understood as a form of rhetoric. Museum interpretation developed as a direct consequence of the advent of the public museum. Throughout the nineteenth century, but with greater intensity from the 1870s onwards, there were increased calls for guide-books 'suited to the wants of unscientific people',[11] for explanatory notes and diagrams, and for descriptive labels (Forgan 1994, 149). By the 1880s, writes Tony Bennett, the idea of the museum as 'a collection of objects whose meaning is to be rendered auto-intelligible through a combination of transparent principles of display and clear labelling' had become 'the accepted new *doxa* for museum practice' (Bennett 1998, 27).

In considering the construction of knowledge in the Kew Museums, I assume Christopher Whitehead's definition of knowledge, which is cognisant of the

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[10] 1872 [C.536] *Royal Commission on Scientific Instruction and the Advancement of Science. Vol. I. First, Supplementary, and Second Reports, with Minutes of Evidence and Appendices,* pp.434-35, ¶6662

[11] 1874 [C.884] *Fourth Report of the Royal Commission on Scientific Instruction and the Advancement of Science,* p.19, ¶135

particular ways in which knowledge is produced in museums. In this context, knowledge encompasses accounts *and* ways of accounting or 'modes of representation'. Hence knowledge is not just the *result* of perception, learning and reasoning; it also includes the *processes* of perception, learning and reasoning which produce particular results (Whitehead 2009, 8).[12] And in considering the mechanisms by which interpretative materials contributed to knowledge production, I adopt here three perspectives: firstly, and specifically in relation to the reception of objects, Stephen Greenblatt's notions of 'resonance' and 'wonder'; secondly, in evaluating the Museum's use of objects from the domestic or broader exhibitionary spheres, I turn to Star and Griesemer's concept of 'boundary objects' (Star & Griesemer 1989); and finally, with regard to the creation of scientific authority, I reference the significance and forms of objectivity in nineteenth-century science, as articulated by Lorraine Daston and Peter Galison (2007).

For Greenblatt, museum objects construct knowledge by evoking in the viewer responses of resonance or wonder. Resonance – 'the power of the displayed object to reach out beyond its formal boundaries to a larger world' (Greenblatt 1991, 42) – is the cognitive process by which the viewer, building on prior knowledge and experience, comes to understand the object as representative of an idea. Wonder, on the other hand – 'the power of the displayed object to stop the viewer in his or her tracks, to convey an interesting sense of uniqueness, to evoke an exalted attention' (1991, 42) – is a sensory response to objects of high visual impact. Both can be used by museums as exhibitionary strategies, but equally both are ways in which museum visitors 'receive' what they behold. Star and Griesemer cast certain objects in museums of natural history as 'boundary objects' – 'those scientific objects which both inhabit several intersecting social worlds … *and* satisfy the informational requirements of each

[12] Emphasis added

of them' (Star & Griesemer 1989, 393). Objects, then, carry different meanings for different visitors, and can thus be used in museums to achieve multiple objectives.

Nineteenth-century museums strove to cultivate scientific authority in every aspect of their functionality, from architecture and display systems (Yanni 1999) to the objects selected for their display cases (Alberti 2011) and the devices deployed to interpret them. Daston and Galison have chronicled the changing nature of scientific representations of phenomena – maps, images, models – from one of 'truth-to-nature' in the eighteenth century, through 'mechanical objectivity' from the mid-nineteenth century, to 'trained judgement' in the twentieth. 'Truth-to-nature' pertains to the role of the privileged eye of the scientist in processes of representation, an eye which knows which elements to exclude, and which to emphasize in order to create an image of 'the characteristic, the essential, the universal, the typical' (Daston & Galison 2007, 20). 'Mechanical objectivity' reflects a later concern to represent nature independently of human intervention and hence of bias. 'Trained judgement', a trend discernible from the early twentieth century, refers to the enhancement of images or instrument readings produced by sophisticated equipment to highlight patterns or delete instrumental artefacts (Daston & Galison 2007, 46). In the Kew Museums 'truth-to-nature' botanical illustrations and the mechanical objectivity of photographs and photomicrographs co-existed, representing different periods of scientific representation but also different regimes of knowledge – plant systematics versus plant physiology and plant economics. As Daston and Galison argue, 'each new regimen of sight supplements rather than supplants the others' (2007, 318) and their approach is useful in understanding the variety of interpretative material on display in the Kew Museums, and the purposes served by it.

Labelling

> A museum without labels is like an index torn out of a book; it may be amusing, but it teaches very little.
>
> Joseph Dalton Hooker 1868a

Thus pronounced Joseph Hooker in 1868 in a response to more 'picturesque' modes of museum display. Just four years later Hooker was called as a witness to the Devonshire Commission, and here he was given an opportunity to enter into more detail concerning the labels in the Kew Museums:

> They generally give as much detailed information as is likely to be read, and this sometimes is very considerable. The Board of Trade returns of the quantities introduced during the year of sugar, coffee, spices, and so forth, are given, the countries from which these products come, their native names, as far as we can ascertain them, and very often interesting information culled from books of travels.[13]

Thus the Kew Museum labels served to animate the objects in the cases by providing a multi-dimensional description encompassing commercial, geographical, indigenous, and ethnographic knowledges, quite aside from scientific details of nomenclature and taxonomy. There is evidence that the Museum of Economic Botany was an innovator in this regard, since the Commission's fourth report called for the use across the museums sector of 'Descriptive Labels instead of the meagre indication of names at present adopted' (1874, cited in Forgan 1994, 150). If objects were to act as lessons, then labels were to constitute the medium through which those lessons were communicated. In 1898 William Flower, referencing George Brown Goode, summarised it thus:

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[13] 1872 [C. 536] *Royal Commission on Scientific Instruction and the Advancement of Science Vol. I First, Supplementary, and Second Reports, with Minutes of Evidence and Appendices*, p.435, ¶6667

> Above all, the purpose for which each specimen is exhibited, and the main lesson to be derived from it, must be distinctly indicated by the labels affixed...A well-arranged educational museum has been described as a collection of instructive labels illustrated by well-selected specimens (Flower 1898, 18).

In the Kew Museums hand-written labels 'combining scientific accuracy with much useful popular instruction' had been prepared for known specimens since 1847, initially under the guidance of John Stevens Henslow (Oliver 1861, 4). By 1861 Oliver was able to claim that there was in place 'a system of copious instructional labelling, which is constantly improved upon, and printed labels substituted for those written by hand' (1861, 3). The Museum had acquired a letterpress and trained a museum attendant to operate it (Hooker 1868b, 8). With their sharply-seriffed type-face set against a white background, the labels must have appeared the very epitome of modernity.

Reader-response theory, which has been successfully appropriated in histories and geographies of the book (Secord 2000; Daston & Galison 2007; Keighren 2010), can also help us in understanding how labels create knowledge in the museum. Reader-response theory recognizes the reader as an agent who actively constructs texts rather than passively consumes them. This act, however, is not wholly individual; in creating meaning, readers reference 'interpretative communities' which are historically and spatially contingent (Fish 1980). Thus visitors from a variety of backgrounds produced a corresponding range of meanings for the objects on display in the Kew Museums.

The Illustrated London News, targeted at a 'respectable, family' readership,[14] certainly found the specimens at the Museum of Economic Botany to be 'all

[14] Patrick Leary 'A Brief History of the *Illustrated London News*'. Accessed 1 August 2012 at: http://gale.cengage.co.uk/images/PatrickLeary.pdf

ticketed in plain language' (Anon. 1850, 220). A typical label conformed to the format shown at Figure 4.8. Firstly the local name, if known, was given – essential information for colonial growers and traders – and was followed by the simplest of descriptions, in this case 'wood'. Only then was the Latin binomial indicated, the *lingua franca* of botanists, horticulturalists, and foresters. Next came details of usages – indigenous usages from which could be projected new applications for British arts and manufactures. And after the geographical source, the final line was reserved for the name of the donor. This had two effects: on the one hand details of donors, be they scientists, colonial governors, or exhibition commissioners, helped to authenticate Kew's claims to botanical authority. For traders and manufacturers, donating to Kew was a means of advertising; a citation in the Museum Guide or in Kew's *Bulletin* reached an international audience, with the added endorsement of the Royal Botanic Gardens. And furthermore, it was not unknown to incorporate the fact into one's own advertising (Figure 4.9). But donating to a public institution was also a means of accumulating 'cultural capital' (Bourdieu 1993), a prime motivation amongst the upwardly-mobile mercantile class of the Victorian era (Hill 2005, 53-68).

The assemblage of data presented on the label in this particular order was unprecedented at Kew. Systematic botany, as represented by herbarium specimens, used a labelling system suited to the needs of taxonomists. Contemporaneous labels on specimens in the Kew Herbarium reveal the lack of a single convention but might bear the collector's name, '[the plant's] name, if known, and the date and place of collection' (Hooker 1859b, 416) (Figure 4.10). The Latin binomial was usually the only name given, reflecting the herbarium's scientific roles of classification and nomenclature.[15]

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[15] Out of a random sample of 765 nineteenth-century herbarium sheets at Kew, 735 had a source (country, region, city); 436 had a collector's number or herbarium number; 161 gave the altitude; 136 had a plant description; 106 had a habitat description; 106 had a herbarium name

Museum guide-books

The 1927 poster advertising the *Official Guides* to the Museums and (Marianne North) Picture Gallery restated a view of the guide-books that had long been held at the Kew Museums: 'Not only do the Guides enable visitors to make good use of the Museums but they are useful works for home reference as they contain valuable botanical and economic information'. Kew published numerous editions of museum guides between 1855 and 1927. From 1861 to 1875 the *Official Guide* was on sale at Kew and at W. H. Smith's railway book-stalls, costing six pence. At a time when popular botany textbooks commanded prices in the order of shillings,[16] the guide-book represented particularly good value to middle-class consumers and served for a number of readers as their first and possibly only text on economic botany, thus shaping understandings of this 'new' branch of science.

Whilst the labels described their accompanying objects, contextual knowledge of the Museums and their contents was to be found only in the guide-books. This held particularly true for Hooker's 'instructive' arrangement: although the cases were numbered, the underlying significance of this could only be understood by reference to the guide. Henry Cole had claimed of the South Kensington Museum that 'although sample catalogues and guides are prepared and are preparing, it will not be necessary for the poor man to buy one, to understand what he is looking at' (Cole 1857, 21-22). By this standard, the Kew Museums must be considered less of an open book. In 1861 the guide-book's 6d cover price represented two hours wages to a labourer in southern England (Brown & Hopkins 1955). Until 1916 when a one penny admission fee

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(the one the specimen was originally collected for); 27 bore the name of a survey and 17 the name of an expedition (Anne-Marie Weech, RBGK, *pers. comm*. 9 January 2012)

[16] For example: Archer's *Popular Economic Botany* (1853) had an initial cover price of 7s 6d; Lindley's *Medical and Oeconomical Botany* (1849) – 14s, and his *Ladies' Botany* (5th edition) (1856) – 12s 6d. Source: *The English Catalogue of Books. 1835-1863.* Accessed 1 August 2012 at: http://www.hathitrust.org/

was introduced, entry to Kew Gardens was free, and this explains its popularity amongst the labouring classes. The museum 'code', however, was available only at a cost.

Images

The visual representation of scientific subjects is demonstrably a key element in defining not only those subjects, but the disciplines within which they are situated (Rudwick 1992; Moser 2006). Museums like the Museum of Economic Botany acted in themselves as scientific representations and thus played a major role in the construction of scientific disciplines, but here we are particularly interested in the contribution made by illustrations and photographs. Daston and Galison argue that it is the very images in scientific atlases which 'make the science'; they stabilise natural objects, they teach how to distinguish the essential from the incidental, and the typical from the anomalous. Furthermore they standardise scientific knowledge by teaching 'how to describe, how to depict, how to see', and in doing so, they 'assume the existence of and call into being communities of observers who see things in the same ways' (Daston & Galison 2007, 22-27). Put simply, pictures build disciplines; but how did images function within the Museum of Economic Botany to build new knowledge?

Botanical illustration has always stood as a substitute for the living plant; plants lose much of their visual character when dried, pressed, or preserved in alcohol. Illustration depicts the 'ideal' or generic plant, and furthermore, one which is simultaneously fruiting and flowering (Saunders 1995); it reveals the colours of the living plant and magnifies particular features. Predating the new regime of objectivity which emerged at mid-nineteenth century, botanical illustration represents an earlier way of presenting scientific knowledge using truth-to-nature practices of 'selecting, perfecting, and idealizing' which have

persisted in botany and which co-exist alongside subsequent media of objectivity (Daston & Galison 2007, 43).

Matilda Smith was responsible for the *Scheelea kewensis* illustration from *Curtis's Botanical Magazine* (RBGK 1897) which was placed alongside specimens in Case 67 (Figure 4.4). It was drawn in the 'illusionistic pictorial' style (Saunders 1995, 15) favoured by the publication. *Curtis's* had a large horticultural readership, many of whom were also Kew visitors. Colour was an essential element of illustration for this audience, as it was a key criterion in selecting plant varieties. That the *Scheelea* was painted from an herbarium specimen is clear from the way the palm leaf is depicted folded at angles to fit the frame, a practice frequently adopted on herbarium sheets (Figure 4.10).[17] Kew, as a botanical complex with gardens, hothouses, herbaria, and publishing interests, was in a position to use practices from other aspects of its operation to new effect in the Museums. Botanical art had a particular resonance with female visitors (Rudolph 1973). In Britain the pursuit of botany by gentlewomen had became a fashionable pursuit from 1760 as the Linnean system became more widely known and practised (Shteir 1996, 2-4), but by the mid-nineteenth century plant collecting, preserving, and illustrating became pastimes for a growing middle class in pursuit of fashion and respectability, and a number of books were published for this market (1996, 153).[18] Botanical illustration adorned the homes of Victorians and, in the museum setting, provided a bridge between personal and scientific understandings.

Among the most iconic of the illustrations used in the Kew Museums are the diagrams to be seen in photographs suspended from the balcony of Museum No. 2 (Figure 4.11). These hail from the German-speaking scientific

[17] In *A Manual of Scientific Enquiry*, William Hooker advised that 'long slender plants, as *grasses*, *sedges*, and many *ferns*, may be doubled once or twice' (Hooker 1859, 415-16)

[18] See Lindley 1834-37; Loudon 1842

community: Leopold Kny's *Botanische Wandtafeln* (1874) (Figure 4.12) and the *Anatomical and Physiological Atlas of Botany* (1880) by Arnold and Carolina Dodel-Port (Figure 4.13). Arnold Dodel-Port was a botany professor at the University of Zurich and his wife Carolina illustrated this series on plant physiology. Husband and wife were in correspondence with Charles Darwin, who in 1877 received from them a set of the first lithographic plates prior to publication of the atlas,[19] and this was followed up with a gift of the first part when published in 1878.[20] It seems possible, therefore, that Darwin recommended the *Atlas* to Joseph Hooker. 'One part of the Dodel Port Atlas' was accessioned into the Museum in 1882, but whether this was a donation or purchase, and from whom, is unspecified.[21] Carl Ignaz Leopold Kny was professor of botany at the University of Berlin, and director of its Institute of Plant Physiology. He was in correspondence with Joseph Hooker from 1871 to 1892,[22] and in 1871 sent Hooker what must have been plates for the first set of the *Botanische Wandtafeln,* with the hope that 'you would deem them worthy of a corner in your botanical museum'.[23] The gift paid off as three purchases were subsequently made of additional diagrams from the series in 1895, 1909, and 1911.[24]

In considering the role of the diagrams in Museum No. 2, what is interesting is that both of these series dealt with plant structure, rather than economic

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[19] Darwin Correspondence Project, Letter 11039: Darwin C. R. to Dodel-Port, Arnold, 6 July 1877. Accessed 12/11/2011 from www.darwinproject.ac.uk

[20] Darwin Correspondence Project, Letter 11554: Darwin C. R. to Dodel-Port, Arnold, 15 June 1878. Accessed 12/11/2011 from www.darwinproject.ac.uk

[21] RBGK EBC, Museum Entry Book 1881-95, EBN 8.1882

[22] RBGK Archives, DC 139 German Letters A-K 1858-1900, ff.660-665

[23] Letter to J. D. Hooker from L. Kny 21 December 1871; RBGK Archives, DC 139 German Letters A-K 1858-1900, f.660

[24] RBGK EBC, Museum Entry Book 1881-95, 3.1895; Museum Entry Book 1896-1924, EBN 136.1909 and 141.1911

botany.[25] This was symptomatic of an epistemic shift in the Kew Museums towards plant physiology associated with the appointment of Thiselton-Dyer as assistant director in 1875, a subject dealt with in more detail in Chapter Eight. It is my belief therefore, that the diagrams functioned primarily at the level of scientific authority. Firstly, the Dodel-Ports, as we have seen, were patronised by Charles Darwin, a key member of Joseph Hooker's own interpretative community. Secondly, the charts represented a clear case of Kew nailing its botanical colours to the mast in its embrace of the 'new', physiological botany from the German-speaking world. And thirdly, although such charts were designed originally for German elementary schools, in Britain they were most likely to be associated with universities; in the period prior to the First World War, most university botany departments had at least one set (Walters 1989, cited in Bucchi 1998, 161). As 'boundary objects' associated with scientific research, pedagogy, and academia, their presence aligned the Kew Museum with the academy and legitimised the knowledge displayed there.

Photographs

To provide evidence of a plant's biogeographical context, the Kew Museum looked to photography. Whilst herbarium botanists generally disdained the use of photography (Daston & Galison 2007, 105), it was more positively received and utilised as an interpretative medium in the Kew Museums. Individual images helped form knowledge about individual plant species in juxtaposition with other display elements. However, as Kelley Wilder argues, as a collection or archive, photographs form 'a much larger narrative history' (Wilder 2009, 100); at Kew the assemblage of displayed photographs constituted an important component in the creation of an identity for the

[25] There were numerous series on economic plants in publication including Zippel & Bollmann (1879-82). Certain of these were displayed in a stand with swinging frames in Museum No. 3 (RBGK 1886, 69).

discipline of economic botany – one which spoke of modernity – and in distinguishing it from other branches of botanical science.

The first photograph accessioned into the Museum collection was in 1858. This and other donations received throughout the 1860s came from private individuals – 'genteel amateurs' interested in travel and botany (Tucker 2005, 18). By the late 1860s, the camera had become an apparatus of colonial survey, and donations from Hugh Cleghorn in India and Ferdinand von Mueller in Melbourne reflect this. As an extension of this trend, photographs became widely used by colonial commissioners in international exhibitions. In an attempt to attract emigrants and investment, for example, the Australian commissioners used photography to illustrate the resources of their respective colonies and to present them as modern and progressive (Figure 4.14) (Hoffenberg 2001, 139-41). Kew directors and curators requested and received such images from numerous exhibitions, and there can be little doubt that their intention was to present the Museums as similarly modern and progressive.

Like botanical illustrations, photographs in the museum space were used as 'mediators between scientific and popular culture' (Tucker 2005, 10). 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. The Kew photographs acquired additional scientific allure from their regular appearances at Royal Society *conversazioni* from 1872 onwards (Tucker 2005, 195). As photographs became objects of mass consumption via international exhibitions and other public displays,[26] so in the Kew Museums they became increasingly resonant with visitors. It was only at the end of the century that magazines and newspapers begin to reproduce photographs; prior to that people were most

[26] The Great Exhibition of 1851 featured the first international photography competition (Tucker 2005, 22)

likely to view photographs, if not in private or public albums, then in the venues of public science: exhibitions, popular science lectures and demonstrations, and of course museums (2005, 8). For almost half a century, photography was associated first and foremost with scientific endeavour.

It is uncertain precisely when the first photographs went on display in the Kew Museums but by 1878 there was a display of photographs of Kew and various colonial gardens in Museum No. 3 (Hooker 1879, 50), acting as an illustration of Kew's imperial mission at the centre of a network of satellite gardens. In the Museum of British Forestry photographs were used to show 'forestry operations [which] are difficult to reproduce on a small scale in a museum' (RBGK 1919, 5). Furthermore, Case 67 reveals that photographs might be placed in display cabinets alongside specimens to give an impression of the scale and appearance of the living plant in its phyto-geographical context (Figure 4.15).

No photographs spoke more of scientific objectivity than the photomicrographs which the Museum began to collect from 1872. Indeed, photomicrographs appeared to take objectivity to new levels – the 'mechanical objectivity' of the camera trained on the microscope lens, ostensibly admitting as little human intervention as possible (Daston & Galison 2007, 20). Yet, as Wilder relates, they were not always what they seemed. It was Robert Hooke in his *Micrographia* of 1665 who had first introduced the convention of a circular image to simulate the view down the barrel of a microscope. With the advent of cameras, photographs of plants could be taken at cellular level, but the practice of presenting these in a round format – 'to conjure up scientific overtones' (Wilder 2009, 109) – persisted (Figure 4.16). The first photomicrographs came to Kew from two chemists: Dr. James Campbell Brown

of the Royal Infirmary School of Medicine, Liverpool,[27] and Professor Edward Kinch of the Royal Agricultural College, Cirencester,[28] indicating the connection between early photography and chemistry (Tucker 2005, 42-46), as well as early applications of photomicrography in the teaching of biological anatomy and pathology. As the commercial sector turned to photomicrography to aid the identification of new raw materials, later donors included John Christie of Ide & Christie – 'Fibre, Esparto & General Produce Brokers' –[29] and James A. Weale of Liverpool, a timber merchant.[30] In the Kew Museums 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. But the Museums also provided a new context for this medium; the intricate forms and patterns revealed in microphotographs 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.[31] Photomicrographs, it appears, had the ability to stop viewers in their tracks; they were uniqueness writ large.

Maps

As early as 1850, William Hooker had anticipated that by knowing the provenance of a given plant species displayed in the Museums, 'those interested in such articles will at once perceive that it might be grown in our own colonies possessing a similar climate' (Hooker 1851, 22). However, to aid the commercial visitor or student interested in the geographical origin and

[27] RBGK EBC, Museum Entry Book 1861-1879, EBN 30.1872

[28] RBGK EBC, Museum Entry Book 1881-1895, EBN 25.1888

[29] RBGK EBC, Museum Entry Book 1881-1895, EBN 71.1894

[30] RBGK EBC, Museum Entry Book 1896-1924, EBN 115.1904

[31] A reviewer of the Photographic Society's exhibition of 1889 described the photomicrographs on display 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' *The Times*, Monday September 30th 1889; p.10.

distribution of particular species, the Kew Museum produced a standard map of the world in the late 1850s on which the relevant region(s) were coloured in red (Figure 4.17).[32] This may have been an attempt to facilitate commerce, but it also reflects Joseph Hooker's own interest in 'botanical geography' which he described as 'a philosophical study in the foremost ranks of science', concerned with 'the laws which govern the development, progression, and distribution of forms and species' (Hooker 1855 cited in Endersby 2008, 53). In this description, and in the use of isotherms on the Museum maps, can be discerned the biogeographical approach of Alexander von Humboldt (Browne 1983, 42-47).

Humboldtianism – 'a set of concerns with worldwide observations and mappings of a wide variety of natural phenomena' (Camerini 1997, 358) – was to influence the practices of numerous nineteenth-century scientists, including Candolle, Darwin, and Joseph Hooker.[33] They were drawn to Humboldtian practices of mapping and of mensuration, in the hope of arriving at 'higher laws' (Endersby 2008, 236). Joseph Hooker was an advocate of the 'botanical arithmetic' developed by Candolle, applying it to his own attempts to explain the distribution of plant species (Browne 1983, 64).[34] But in the context of economic botany, Humboldtianism had a more immediate benefit in providing a systematic framework for evaluating species transplantation.

The isotherms on the Kew maps resemble those in Heinrich Berghaus's *Physikalischer Atlas* (1837-48) which had been co-produced with Humboldt

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[32] They are first mentioned in the *Official Guide to the Kew Museums* of 1861 (Oliver 1861, 4). The late 1850s would also fit with Joseph Hooker's appointment as Assistant Director in 1855.

[33] Particularly relevant here is Candolle's *Essai élémentaire de géographie botanique* (1820) from which both Darwin and Joseph Hooker first learnt of botanical geography (Browne 1983, 52)

[34] In the introduction to *Flora Novae-Zelandiae* he speculated that the plants of the Southern Hemisphere were the vestiges of the flora of a sunken continent (Endersby 2008, 232).

(Figure 4.18). By the time maps were introduced into the Kew Museums, isolines represented a relatively new mapping technique in Britain but one of which there was growing awareness. English publisher Alexander Keith Johnston brought out his own *Physical Atlas* in 1849 with separate editions aimed at specialists and schools. It had broad appeal, not least because of the accessibility of its information (Camerini 1993, 510) which included isothermal lines and shading to indicate species density (Figure 4.19). It is interesting to note that Johnston saw the purpose of the latter as showing 'the distribution of *the most useful and valuable* wild and cultivated plants' (Johnston 1852, 7-8), establishing an early link between isoline cartography and economic botany.[35]

As with illustrations and photographs, maps had the effect of bridging the distinction between the professional and popular realms of science, and of resonating with visitors to produce new understandings. The Kew Museum maps illustrated the correspondence between climate and plant species, but they were also constitutive of new knowledge: that, for example, if *Hevea brasiliensis* flourished in the Amazonian rain-forest, it might do likewise in equatorial Malaya; and if *Thuja gigantea* was native to the coastal forests of northwest America, then it might also thrive in Scotland. In the context of economic botany, distribution maps provided a visual framework for evaluating the transplantation of species, a framework for the economic botany project as understood and undertaken at Kew.

[35] Emphasis added

Illustrative series

> Many eminent firms engaged in the importation and manufacture of vegetable substances, have most liberally contributed various illustrative series
>
> Hooker 1855, 2

The visual concept of a series of objects representing the phases of production of a material from plant to finished object was evident in the Kew Museums from their earliest days. In the *Manual of Scientific Enquiry*, William Hooker impressed on collectors that 'the several stages of preparation should be collected, not only as objects of curiosity, but because they exemplify the progress of art and science' (Hooker 1849, 407), and on the very first page of the Museum Entry Book we discover that Captain Sir E. Horne R. N. donated 'various specimens of Tapa cloth; shells and beater for preparing the Tapa cloth; [and] Type made of Pandanus leaves for printing the cloth'.[36] In the following year, Charles Mackintosh & Co. of Glasgow became the first manufacturer to donate to the Museum, furnishing its nascent collection with 'fifteen samples of Indian rubber as imported', and 'thirty-three samples of Indian rubber as manufactured'.[37]

However, Hooker was not the first to adopt the illustrative series for museum display. In 1799 Charles Wilkins's proposal for a museum at East India House had listed under 'artificial productions': 'samples…of every article in silk and cotton, in every stage from the cocoon and pod to the cloth ready for the market' (Wilkins 1799, cited in Desmond 1982, 9). By the early nineteenth century illustrative series were used in exhibitions at Mechanics' Institutes, and the term itself appeared in an 1841 exhibition mounted at the Adelaide Gallery. Amongst the displays there could be found natural history specimens

[36] RBGK EBC, Museum Entry Book 1847-55, EBN 3.1847

[37] RBGK EBC, Museum Entry Book 1847-55, EBN 40.1848

and 'series illustrative of the progressive states which a manufactured article assumes' (Anon. 1841, 191). The Museum of Practical Geology also displayed 'the progress of any one metalliferous mineral...from the geological stratum whence the ore is extracted through the various processes of manufacture till the metal ultimately assumes the forms required for use or ornament' (Becker 1875, 251). At the opening ceremony of the Jermyn Street building in 1851 Prince Albert praised its emphasis on 'the *development* of the immense mineral riches granted by the Bounty of Providence' (cited in Yanni 1999, 52).[38] And in the same year, with the opening of the Great Exhibition, the series also became a regular fixture of displays at world's fairs. By 1862, W. H. Smith's *Popular Guide to the International Exhibition* reflected the extent to which this mode of display had become assimilated by exhibition audiences, through its critique of the geographical arrangement of the Exhibition:

> It would have been much more easy and agreeable, if the visitor could have gone by a series of progressive steps through the whole Exhibition, and have been led from the rough mass of iron to the castings and forgings of marine and other engines, or the finely-finished specimens of metal work; if he could have traced the chemical products in their gradual conversion and adaptation to the various branches of industry and art, or if he could have seen them give the brilliant dyes to cotton, flax, wool, and silk; or if he could have seen by the side of the rough stone from the quarry the almost breathing figures of the sculptor's art (McDermott 1862, 5-6).

By 1887 the convention was in even greater distribution, as a contributor to *The Teachers' Aid* journal observed:

> Many manufacturers keep specimens of their own productions arranged in stages of manufacture. These are often sent to the retail dealer, or exhibited in public places as advertisements. Examples of many of these can be seen at almost every large

[38] Emphasis added

> railway station. This year they are abundantly on view at the various Jubilee exhibitions (Anon. 1887, 265).

The Kew Museum had been one of the earlier national museums to deploy the illustrative series, but over the course of the nineteenth century, the series became an increasingly popular didactic convention, extending across a variety of media and subjects.

The origins of the series concept are equally diverse; there is a clear debt to natural history methods of displaying the life cycles of animals and plants, and as the nineteenth century progressed, an increasing use of the series to illustrate evolutionary theory. Pitt Rivers adapted it to the display of ethnographic productions in his typological series, which first went on public display at the Bethnal Green Museum in 1874.[39] Prior to this trend, however, Nathan Schlanger argues that numismatists had used the series since the eighteenth century as a method of demonstrating the development of coin production (Schlanger 2010). At the heart of this, and of Hooker's usage of the series, lie Enlightenment notions of progress, couched in the colonial context as 'improvement'.

In the first Museum Guide (1855) William Hooker made special mention of specimens of palm oil from western Africa, imported by Messrs. Price and Co, 'and the several preparations it undergoes in its progress towards the perfect candle, in a series of samples presented by that truly philanthropic company' (1855, 5). The relationship was less philanthropic than Hooker's comment suggests. These museo-mercantile networks were symbiotic, the donors receiving a number of benefits in return for donating to the collections. Curators identified specimens that were submitted to them, and could advise

[39] 'Timelines at the Pitt Rivers Museum' accessed 2 January 2012 from http://history.prm.ox.ac.uk/timeline_prm_1860.html

on plant properties, distribution, usages, and growing conditions. In its capacity as 'imperial information exchange' (Driver 2001, 25), the Kew Museum could also broker relationships with suppliers of machinery and services.[40]

Models

The Kew Museums also displayed models in wax, plaster, and wood to demonstrate the appearance of living fruits and inflorescences. Wax models enjoyed a revival in popularity in both domestic and scientific contexts from the 1840s. They were featured at the Great Exhibition of 1851 under Class 29 – 'Miscellaneous Manufactures and Small Wares' – and in the sense that they existed at the meeting point of science and art, they can be seen to have been representative of the Exhibition itself, and indeed of the Museum of Economic Botany. Wax models were undoubtedly polysemic; they presented the Vegetable Kingdom as 'an object of adoration, study, empathy, and utility' (Shteir 2007, 650). According to Shteir, they united two traditions: that of anatomical models dating back to the sixteenth century, and the later art of wax flower modelling which flourished in the 1840s and '50s. As a pastime the latter was 'a gendered and class-linked accomplishment' popular amongst women of some social standing, but it was also a profession practised by an assorted group of artists, traders, and manufacturers and it was one of the few professions open to women. At the pinnacle of the group was the Mintorn 'dynasty' (Shteir 2007, 651-656). In John and Horatio Mintorn's *Handbook for Modelling Wax Flowers* (1844) the brothers listed the benefits of their art: wax models could record 'floral marvels' discovered overseas; they could be used for botanical purposes in museums and other pedagogic establishments; and, they

[40] See letter from Museum Keeper John Masters Hillier, dated July 25th 1914 to a Mr. Cowper, relating to the latter's enquiry about machines for processing Ramie fibre (*Boehmeria nivea*), in which Hillier suggests a number of possible suppliers; RBGK Archives, QX10-0029 Box 1, General Economic Notes.

could beautify the home (cited in Sheir 2007, 652). For botanical subjects wax models could do what dried specimens could not: they could recreate the colours, forms, and textures of the living plant. They provided a means of representing 'the most beautiful specimens' as advocated by Lindley.[41]

However, there was a third tradition of wax modelling: that of historical figures in 'waxworks'. Madame Tussaud's, for example, formerly an itinerant spectacle, opened in the Baker Street Bazaar in 1835 (Altick 1978, 332). Such spectacles operated at the margins of respectability, often pushing against the boundaries of good taste and moral judgement; Tussaud's 'Chamber of Horrors' with its dramatic depiction of the criminal world, typifies this tendency (1978, 332-37). Geographically too, waxworks were marginal affairs, frequently appearing on ephemeral sites in the form of travelling shows. One has only to reflect on the strenuous efforts of Mrs. Jarley in Dickens's *The Old Curiosity Shop* to differentiate her eponymous waxworks show from lower forms of recreation:

> 'It's Jarley's wax-work, remember. The duty's very light and genteel, the company particular select, the exhibition takes place in assembly rooms, town-halls, large rooms at inns, or auction galleries. There is none of your open-air wagrancy at Jarley's, recollect; there is no tarpaulin and sawdust at Jarley's, remember.' (Dickens 2000, 210)

Her hand-bills were distributed to a 'respectable' audience consisting of 'all private houses and tradespeople', 'lawyers' clerks and choice spirits' in the taverns, and boarding schools. At an entry fee of sixpence, Jarley's was in the same price bracket as the Kew Museums' *Official Guide*, and their audiences would have certainly overlapped.

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[41] TNA PRO WORK 6/297 *Report of Committee on Expenditure and Management of the Royal Gardens. Vol.1.*

Kew collected and displayed wax flowers and fruits made by a number of the prominent modellers of the period, including Emily Temple and the Mintorn family (Figure 4.20). The appeal of wax models cut across lines of gender, age and social class. They epitomised the 'boundary object': broad in appeal, they could be appropriated by a range of audiences, a range wider in practice than Hooker's original definition had allowed for. However, this was an effect rather than an intention. In the museum context, wax models, like botanical illustrations, belonged to the 'truth-to-nature' approach to displaying scientific knowledge (Daston & Galison 2007, 55-114). John Stevens Henslow was one of many men of science who advocated the use of wax models in conjunction with scientific diagrams:

> Dried plants from the Herbarium cannot be advantageously displayed in glass cases. The following method may be adopted for the typical epitome:– a few wax models of flowers with figures of such parts as require to be magnified; but especially entire fruits, with dissections exposing the seed and embryo (Henslow 1865, 17).

Nineteenth-century museums had to 'wrench their institutions from the cultural locale of the festival and fair' (Alberti 2007, 377), and at first sight, the use of wax models might have seemed more likely to merge the categories of public science and popular culture than to distinguish between them. But museums are capable of conditioning the cognitive shape of the science produced in their spaces (Livingstone 2003, 37), and it was the context of the Museum set in the Royal Botanic Gardens, and the juxtaposing of specimens and diagrams with the models which conferred scientific authority on them, and which distinguished the Museum of Economic Botany from Jarley's.

As wax models of flowers and fruits were enjoying popularity in a range of contexts – including museums – models of human figures were enjoying a similar trajectory. This was particularly true of models of indigenous peoples

of the Indian sub-continent. Kew built up its own collection from a number of sources. Some fine *genre* figures were accessioned in the dispersal of the India Museum collections in 1879. Later came larger-scale acquisitions, such as a model indigo factory (1886) and a lac factory (1925). These were of high visual impact but their scale created new challenges in the production of coherent knowledge. The next section traces the life of the indigo factory model, examining the contexts of its production, circulation, and reception, before, during, and after its display in the Kew Museums. What emerges from this case study is the spatial contingency of meaning – how space and scale conspire to create and constrict the production of knowledge through interpretative aids.

3. A 'work of subtle brain and hand':[42] the indigo factory model

At the close of the 1886 Colonial and Indian Exhibition in South Kensington, Kew Museum curator, John Reader Jackson, drew up a list of 'specimens exhibited in the Indian Economic Court [which] are necessary to complete the collection made for the Museums, Royal Gardens, Kew'. Number eleven on the list read: 'Model shewing the preparation or manufacture of Indigo'.[43] The model consisted of buildings and one hundred 'well executed' figures of ninety-five indigenous labourers, one white factory owner, and four oxen (RBGK 1893, 83) modelled in clay (Figure 4.21).

On arrival at Kew, the model first went on display in Museum No. 3 (RBGK 1893, 83) which was designated as a space 'devoted chiefly to gymnosperms, specimens of overseas timber, and large articles unsuited for exhibition in the glazed cases of the other Museums' (Figure 2.1) (RBGK 1927, 2). The name of

[42] From Alfred Lord Tennyson's *Ode to the Colonial and Indian Exhibition* 1886

[43] RBGK Archives, Colonial and Indian Exhibition 1886 Volume 1, f.123

the modeller – Rakhal Chunder Pál – which was inscribed on the pedestal marked it out as an art object, distinguishing it from ethnographic productions which were typically un-attributed. The fact that it was donated by the Government of India from a prestigious exhibition,[44] rather than as a trophy from a voyage of exploration, would have certainly compounded its reception as an object of artistic and technical merit. However, its didactic value, so far removed from the indigo display in Museum No. 1, was considerably weakened by its isolation amidst a collection of timbers and miscellanea. By 1907 space had been found for it on the ground floor of Museum No. 1 near the entrance (Figure 4.22) but the display of indigo specimens was on the third floor, once again reducing the didactic impact of the model (RBGK 1907, 60-61).

By 1927 the indigo factory was back in Museum No. 3 and had been joined by a model of a Lac factory from the British Empire Exhibition at Wembley (1924-25). The peripatetics, though, were far from over. The model survived the 'cull' which took place further to the Ashby Report of 1958, in which approximately 2,000 ethnographic objects were transferred to the Horniman, Pitt Rivers, and British Museums. Clearly these exhibitionary models were not perceived as having a useful ethnographic function.[45] With the demise of Museum No. 3 in 1959, the model was returned to Museum 1.[46] On the closure of that building in 1987, it lay in store until 2007 when it underwent a conservation exercise in preparation for a touring exhibition.[47] Since its return in 2008, it is back on display in the former Museum No. 1 which houses the *Plants+People* exhibit.

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[44] RBGK EBC, Museum Entry Book 1881-95, EBN 182.1886

[45] Correspondence dating from 1959 reveals the attempts of director George Taylor to transfer 'old models in No. 3 Museum' to museums in Britain and India; RBGK, EBC, 'Indigo Factory' file (unarchived).

[46] RBGK Archives, *Report of a Visiting Group to the Royal Botanic Gardens, Kew (Chairman: Sir Eric Ashby) [in March 1957]* Great Britain (MAFF) 1958.

[47] *Indigo: a blue to dye for* was shown at Birmingham, Brighton, and Southampton

Life before Kew

The 1886 Colonial and Indian Exhibition which first displayed the indigo factory model aimed to show and to tell: to show via its exhibits the extent of British sovereignty overseas, and to tell of the 'development and progress' made within her territories (C&IE 1886c, 5). This notion of development and progress, coupled with the theme of global predominance, pervaded the rhetoric of the exhibition. As Saloni Mathur argues, compared to previous exhibitions held in the capital, this was 'a more powerfully ordered vision of empire' which 'expose[d] the way that knowledge was reorganized to underwrite colonial expansionism' (Mathur 2007, 53).

The Indian Court occupied a significant proportion of the total exhibition space, and furthermore, in its position immediately beyond the main entrance, figured prominently (Figure 4.23). At the opening ceremony Queen Victoria traversed the Indian galleries in order to take up position on a golden throne which had been seized in the capture of Lahore (Mathur 2007, 56). India's prominence was due not only to its exhibitionary geography and royal visitors, however, but equally to the sumptuous nature of its displays, which created 'a carefully constructed general *experience* of India' supported by scientific knowledge and new technologies such as electric lighting (2007, 57). The Court was sub-divided into three distinct areas: the Art-Ware Courts, the Administrative Courts, and the Economic Court (C&IE 1886c, 10). The latter, under the stewardship of George Watt, was arranged 'scientifically' in contrast, for example, to the Art-Ware Courts, which adopted a geographical arrangement. Watt, a botanist, had first been seconded to the Agriculture Department of the North-Western Provinces by the Imperial Government in advance of the Calcutta Exhibition of 1883-84, charged with the task of expanding the Department's economic collections and arranging them scientifically. In this he was assisted by Trailokya Nath Mukharji, the highest-ranking Indian

expert employed by the Department (Hoffenberg 2001, 52). At Kew the fruits of Watt's and Mukharji's labours did not escape the attention of Thiselton-Dyer who wrote to the India Office: 'I am struck with the copiousness and excellence of the samples which have been transmitted to this country by the Agriculture Department. With some experience in such matters I may confidently say that nothing of the kind has been seen in Europe before.'[48]

At the 1886 Exhibition, the indigo factory model had stood in the South Annexe of the Indian Section, which lay adjacent to the Economic Court. This court was believed by the *Westminster Review* to best represent 'the progress made in India under British rule' (Anon. 1886c, 33), offering us a glimpse into how the model itself may have been 'read' during its life at the exhibition. The annexe was a space containing a number of clay models, and in the *Official Catalogue*, clay modelling was singled out as 'an art which seems capable of attaining considerable excellence in India' (C&IE 1886a, 12). The indigo factory was intended to 'make intelligible the brief account given of the process of indigo manufacture' in the adjoining Economic Court, where specimens of indigo were exhibited (C&IE 1886b, 147). It was deemed by one reviewer to be one of the 'principal features' of the Economic Court (Cundall 1886, 21).

The model itself was not merely the creation of imperial mythmakers. The tradition of clay model-making in India dates to between 2500 and 1700 BC (Smith & Stevenson 2010, 39) and is rooted in the production of models of deities. Krishnagar was, by the eighteenth century, a 'contact zone of multiple presences' (Chatterjee 2011), and the modellers reacted to the new markets represented by British trade, residency, and rule. Britons residing in India collected the clay figurines to display in their homes, and many of these made

[48] Letter dated 3 May 1886 from Thiselton-Dyer to A. Godley; RBGK Archives, Colonial and Indian Exhibition 1886 Volume 1, f.104

their way back to Britain.[49] Another market consisted of exhibitions (Wintle 2009), and the Great Exhibition of 1851 marked the start of a significantly broader circulation of the figurines (Mukharji 1888, 62; Barringer 2005, 246).

Krishnagar modellers belonged to the artisan class of Kumars, or potters, a class whose rank was immediately beneath that of Brahmans and writers (Mukharji 1888, 60). The creator of the indigo factory figures, Rakhal Chunder Pál, was recognised by Mukharji as 'the best artist in miniature scenes', but 'he charges a very high price' (1888, 68). Mukharji was certainly in a position to judge; he was responsible for commissioning the model. It was a replica of one produced for the Calcutta Exhibition of 1883-84,[50] which had been funded by Messrs. Begg, Dunlop, & Co., a company with indigo and jute interests in Bengal. That model, too, circulated beyond India; in 1910 it was loaned to Harrod's Stores for a 'small exhibition' on Indian indigo, illustrating the extent to which economic botany was subject matter for the whole of the exhibitionary complex, and to which representations of indigo production would have resonated with contemporary audiences.[51]

Indigo industry and imagery

The journalist who reported on the 1886 exhibition for the *Westminster Review* observed, 'There are also many dyes, of which indigo is the principal, a very interesting model of an indigo factory (of which there are thousands chiefly under European management) being exhibited' (Anon. 1886, 34). Indeed, at

[49] London-based art dealer Indar Pasricha has been greatly responsible for the recent resurgence of interest in Indian clay models which he has acquired from sales of British estates http://www.indarpasrichafinearts.com/figures.html

[50] Now at the Indian Museum in Kolkata

[51] RBGK Archives, MR/164 *Annual Report of the Indian Museum Industrial Section for the Year 1909-1910,* p.24

the time of the 1886 exhibition there were 3,414 indigo factories in British India, with the majority managed by Europeans (C&IE 1886a, 81). The best species of indigo for dye – *Indigofera tinctoria* – is a plant native to the Indian sub-continent, and reports from European visitors indicate that it was already being cultivated for its dye in the sixteenth century. With the establishment of the EIC in 1600, plantations were introduced to the Bengal region. During the American War of Independence (1775-83), supplies of indigo from North America and the West Indies were obstructed, so in response, the EIC encouraged further planting in India and brought in planters from the West Indies who had previously managed enslaved workers. The industry peaked in 1847, but thereafter went into a steady decline, with the final blow dealt by the introduction of aniline 'Indigo Pure' in 1897. By 1914 the price of natural indigo was 50% of that reached at mid-nineteenth century (Balfour-Paul 1998, 70-85).

The spaces of indigo cultivation and production were sites of conflict between coloniser and colonised. 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). At the same time these spaces were a source of endless fascination for Europeans and not only because of their commercial potential. Pictorial representations of indigo production date from at least the seventeenth century and Pomet's 1694 illustration of enslaved workers in the French West Indies establishes an enduring trope of such representations – that of the white owner or agent overseeing his ranks of indigenous labourers (Figure 4.24). In the nineteenth century images of Indian indigo factories circulated in the popular press and bore a striking resemblance to earlier depictions. A series of illustrations in *The Graphic* in 1887 reflects the interest generated by the model at the exhibition a year earlier (Figure 4.25).

Oscar Malitte's photographs, a number of which found their way into Museum No. 1, offer a stark vision of indigo production. Indigenous workers appear alongside the raw material, as an integral part of the resource to be deployed in processes of imperial wealth creation. Labour is foregrounded, and man is machine, standing in serried ranks, waist-high in indigo, beating mechanically. The circumstances surrounding the taking, processing, and circulation of these images are unclear. Five prints from a series of twenty (plus seven by an unknown photographer) were donated to the Kew Museum in 1900 by Christopher Rawson FIC, FCS (Figure 4.26). Rawson, an analytical chemist from Bradford, toured Bihar in 1898 in the interests of a consortium of indigo dealers, with a view to improving indigo manufacture and cultivation.[52] In an article written on his return, he indicated that the model at Kew was a somewhat out-of-date representation of the then current Bengali process, in which mechanised beating of the dye had 'almost entirely' replaced hand-beating (Rawson 1899, 168). The photographs were placed alongside the indigo specimens in Museum No. 1, but collectively, this assortment of views taken over a twenty year period, created a somewhat fractured image of the Bihar indigo industry. In fact, 1898 – a year after BASF's launch of 'Indigo Pure' – was the year when the conditions of those working in indigo cultivation and processing were at their harshest.[53]

Reception at Kew

The figures in the indigo factory have appealed to visitors variously during their life in the Kew Museums. In the 1926 novel *Adam's Breed*, set in the early twentieth century, an Italian immigrant family visits the Gardens. In Museum 1 they encounter the model:

---

[52] Letter from Christopher Rawson to William Thiselton-Dyer, 22 April 1898; RBGK Archives, MR/130 India Economic Products L-J, f.92

[53] BASF: Badische Anilin Soda Fabrik

> The museum was stuffy and very dull, two cases only were amusing. These stood by the door; they contained little people – natives with carts and oxen. The children stopped in delight before them.
>
> "What funny clothes!" remarked Berta.
>
> Gian-Luca agreed. (Hall 1985, 77)

In this account written from a child's perspective, the attraction of the figures is their scale and their exotic otherness. They are identifiable as 'natives' because they have carts and oxen, but also because they wear 'funny' clothes. Models were strongly advocated for the teaching of geography in schools by John Scott Keltie who, in the 1880s, was appointed by the RGS to investigate geography teaching in Britain and abroad. During the late nineteenth and early twentieth century they were widely considered as tools with which to sculpt British imperial citizens, providing children with knowledge of Britain's overseas territories, and making 'the notion of possession meaningful' (Ploszajska 1996, 395).[54] The children in Hall's novel appear to have internalised this ethos, intrigued by, yet accepting of, the colonial subjects in the model.

A visitor to Museum No. 3 in the 1950s also remembers seeing the indigo factory as a child, although recalls the figures as Chinese:

> It had displays that were very attractive to a young child, because it was like looking into a doll's house, really, it had these displays of what were, from memory, Chinese people, working away…but there was something terribly exotic, somehow, about the displays as well, which made them a bit unusual, made them somewhat enticing but frightening for a small child.[55]

[54] For more on this see Chapter Five

[55] Interview conducted by the author 14 March 2011

Despite the temporal distance between this real-life visitor and those in Hall's fiction, the reactions are remarkably similar.

The 1886 Colonial and Indian Exhibition which first displayed Kew's indigo factory has been characterized as portraying India as 'a timeless, unchanging, ancient land, dotted with jungles, natives, and village bazaars, at once geographically and temporally removed from the hectic pace of industrial life' (Mathur 2007, 10-11). Krishnagar figures themselves have been understood as belonging to an 'orientalist iconography of Indian labour', depicting the Indian labourer as 'skilled yet indigent', even 'pitiful' and 'barbaric' (Kriegel 2007, 117-20). This, it seems to me, underestimates the agency of the modeller in the representational process. Krishnagar modellers were high-caste artisans with some degree of artistic autonomy. Commissions for the institutions of the exhibitionary complex, such as the indigo factory, demonstrate in their detail – two labourers fighting in the foreground (Figure 4.27), another sleeping in the shade – a capacity for both resistance and mutability in situations of trans-cultural encounter (Thomas 1991). Rather, and particularly in the spatial and ideological contexts of the 1886 Exhibition and the Kew Museums, the model was a scene 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 different tradition of representing India which was to reach its zenith in the early twentieth century with the establishment of the Colonial Office Visual Instruction Committee (COVIC) (Ryan 1994). Like the photographic output of COVIC, the indigo factory model incorporates 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).[56]

[56] For more on COVIC, see Chapter Five

Jackson, the curator, perceived the model as an element required to 'complete' the museum collection, to provide the analogy between a fibrous plant and a bag of laundry blue (RBGK 1907, 61) and to account for the succession from the one to the other, although its ability to do so was compromised by its very distance from those objects in Museums 1 and 3. In the absence of adjacency, its iconic status with children and adults alike can be attributed as much to the allure of the miniature, to the Lilliputian 'otherness' of the scene, in short, to wonder, as it can to resonance.[57]

4. Conclusion: rationalities of display

We have seen in this chapter how objects, space, and interpretation were used in the Kew Museums to create knowledge. Interpretative devices from the domestic, pedagogic, and commercial milieux built cognitive bridges between museum objects and visitors; and techniques from the academic and scientific spheres imbued the Museums with scientific authority and facilitated the acceptance of the scientific claims displayed there. Further, eye-witness accounts have provided an indication of the ways in which the museum displays were received. Economic botany could not be described as a discipline in England when the first of the Museums opened at Kew in 1847, but during the first four decades of its existence, the Kew Museum was *the* site, particularly in London, for the disciplinary formation of economic botany. This chapter has looked in detail at the evolving form of economic botany as represented in the displays of the Museum's displays, and finishes by considering their underlying rationality.

In trying to define the rationality which enabled plants, tools, ethnographic artefacts and European manufactures to be displayed in the space of the same

[57] An account of the model from an adult's perspective is given in the novel *Burning Bridges* (Leitch 1989)

cabinet alongside illustrations, photographs, maps and models, contemporary accounts are particularly revealing. In popular periodicals and newspaper reports of the Kew Museum there is no suggestion that such a combination may have been problematic, no surprise expressed at what might appear today a somewhat Borgesian array. *The Lady's Newspaper* (Anon. 1848) commented on the various kinds of woods and the 'beautiful objects…formed of the ornamental woods used in the arts'; the *Illustrated London News* praised 'the great variety of manufactured specimens of vegetable substances' (Anon. 1850, 220); and Mrs. Goldney, in her 'un-botanical' guide to Kew, spoke of the Museum's contents as 'economic products and preparations', adding by way of explanation that 'this might be termed a Museum of Commercial Botany' (Goldney 1898, 3). But the notion of a museum portraying 'the career of the Cotton Plant, from the period of sowing until it reaches the goal of its ambition – the covering of the human frame' (1898, 4), appears beyond controversy.

In this context, Hooper-Greenhill's model of the 'modern' museum – one in which the organising principles were analogy and succession – appears at first sight to offer further explanation. In this view of the nineteenth-century museum, it was the internal relations between objects that were of principal concern; the link between one structure and another was now the relationship between their respective parts, and the functions these performed. Science had become physiological; biology replaced natural history. But in order to explain how things came to look as they did, the spaces of display also had to accommodate the dimension of time (Hooper-Greenhill 1992, 17). The tabular display of the Classical period was, according to this argument, replaced by the linear display of the Modern. To paraphrase Darwin, whose own work had a profound epistemic influence on the modern museum, classifications became genealogies (Darwin 1859, cited in Bennett 2004, 50).

However, the displays at the Museum of Economic Botany cannot be interpreted as wholly tabular or linear. In addition, economic botany in the third quarter of the nineteenth century did not concern itself primarily with the organs of plants and their inter-relations; rather it understood plants and their constituent organs in terms of their utility to humankind. Furthermore, it should be emphasised that the time scale adopted by the nineteenth-century museums to which Hooper-Greenhill refers was one of 'deep time' or 'pre-history', a term which first appeared in the 1840s; the modern episteme represented a response to advances in geological, archaeological, and palaeontological knowledge and, later, to Darwinian theory. In the ensuing climate of positivism, there was a discernible tendency to undervalue the role of human agency. This was epitomised in Pitt-Rivers' typological displays which configured developments in object design as a process of natural selection.

The Museum of Economic Botany, however, placed emphasis on the natural world as a source of bounty; on the changes wrought on raw materials by human hands; and on the potential of present materials to be transformed into future commodities. A tree species used to make totem poles might also be valuable for construction; a palm fibre used in fans and whisks might be applied to rope and carpet production. The Museum concerned itself less with past developments than with forward projections. Its epistemology was, in short, one of 'process' and 'transformation'.

Figure 4.1 'Economic Museum. Hortus Kew. Fam: Palmae, *Maximiliana regia* (Demerara) Maripa Palm' (Case 67, Museum No. 2)

Photograph by Johannes Lotsy 1902; ©RBG, Kew

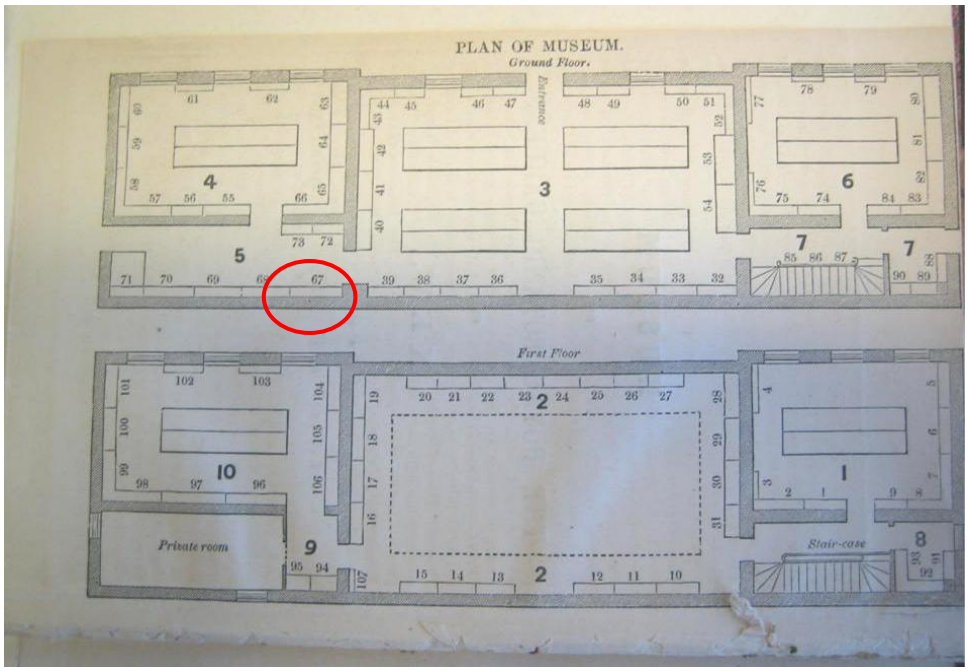

Figure 4.2 Plan of Museum No. 2 showing position of Case 67

Source: Hooker 1855 ©RBG, Kew

Figure 4.3 East end of Museum No. 2 1960

Case 67 occupied the equivalent position at the west end of the Museum to that indicated here thus:

Photograph by R. Zabeau; KPI X82-603 ©RBG, Kew

Figure 4.4 *Scheelea kewensis*, Hook. F

Source: *Curtis's Botanical Magazine* 1897 ©RBG, Kew

Figure 4.5 Museum No. 1: Side-lighting and library-style disposition of display cabinets c.1900

Photograph by E. J. Wallis; KPI W-440 ©RBG, Kew

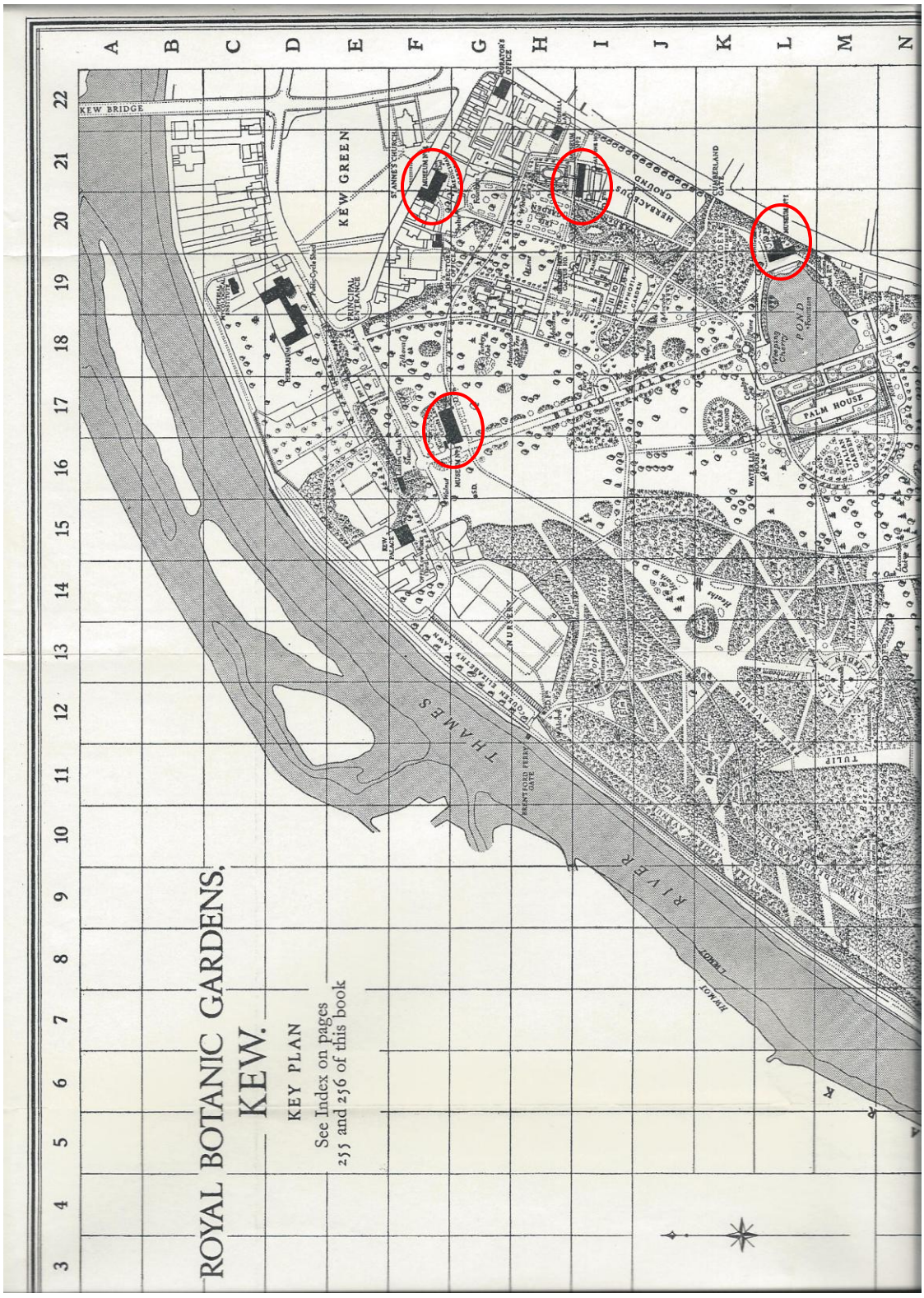

Figure 4.6 Plan of Kew Gardens showing the location of Museums 1-4

Source: Turrill 1959

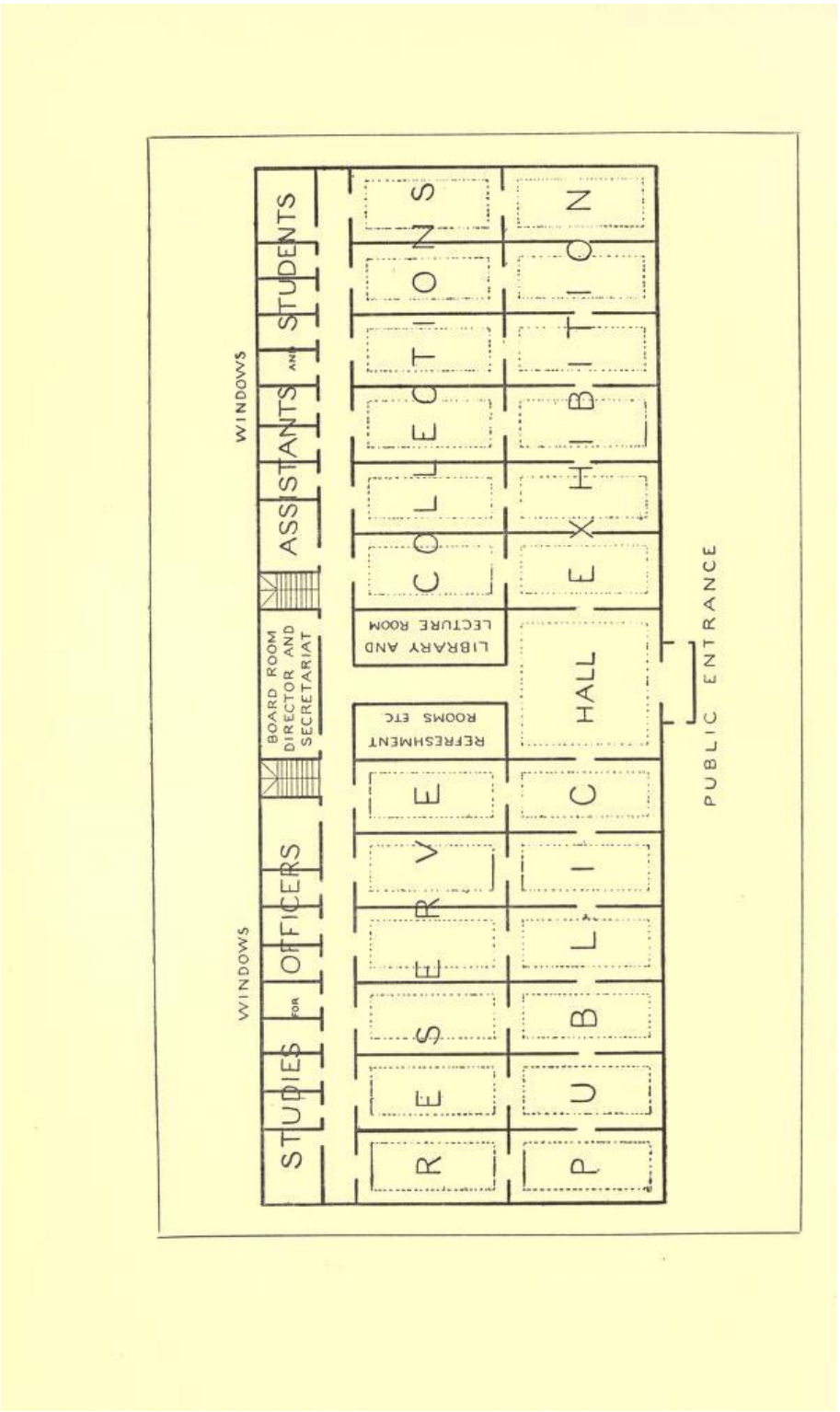

Figure 4.7 Plan embodying the principles of Henry Flower's 'new museum idea'

Source: Flower 1898

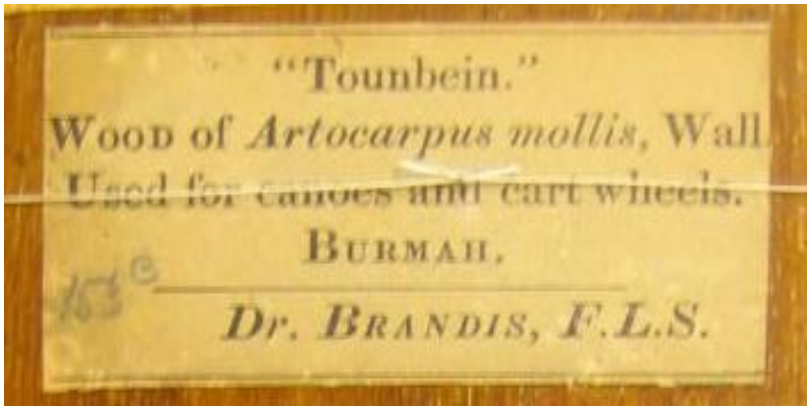

Figure 4.8 Typical Kew Museum label

Top to bottom: local name, Latin botanical name, local usages, geographical source, donor

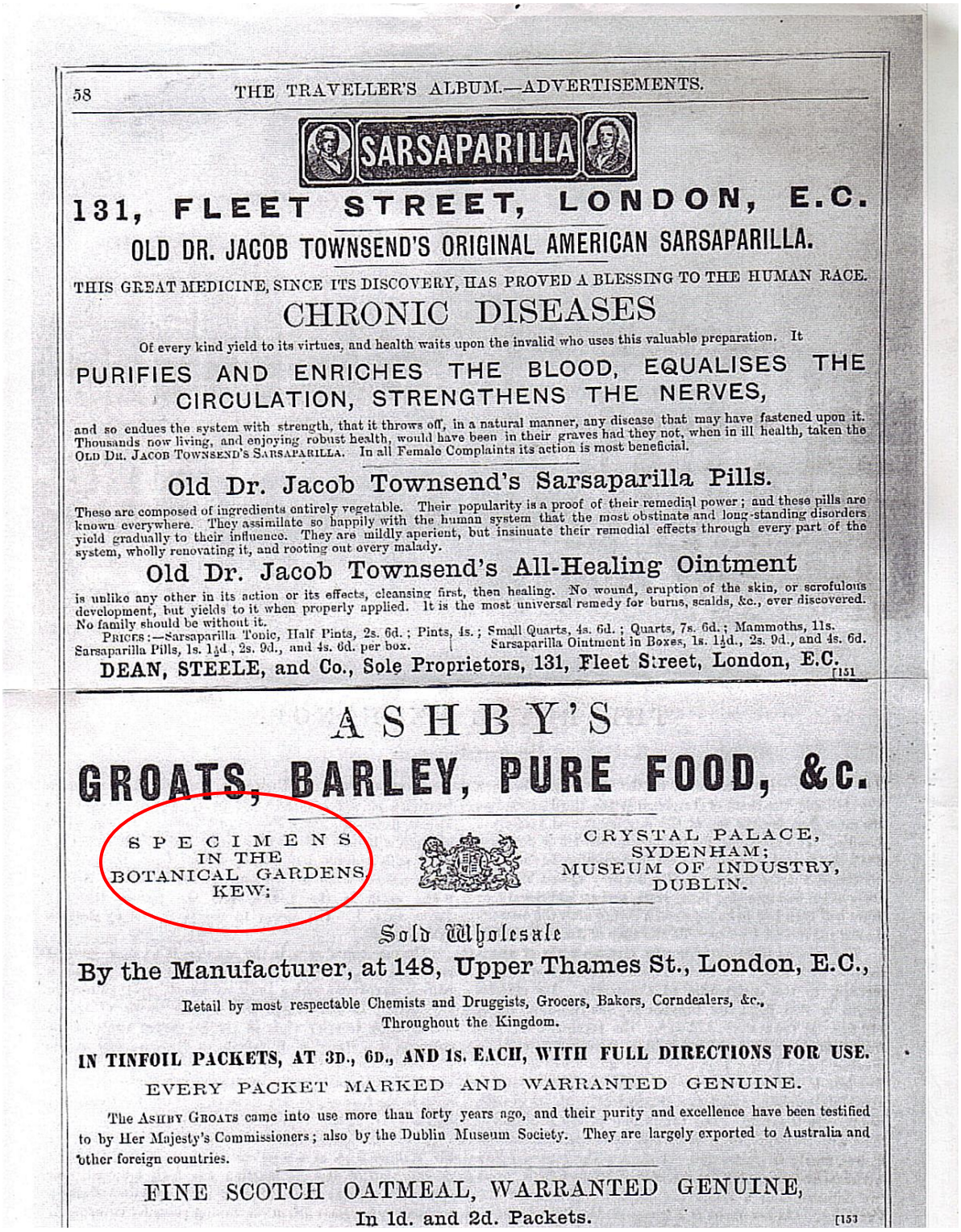

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Figure 4.9 Advertisement in *The Traveller's Album* 1862

Figure 4.10 *Obignya sagotii* Trail ex Thurn

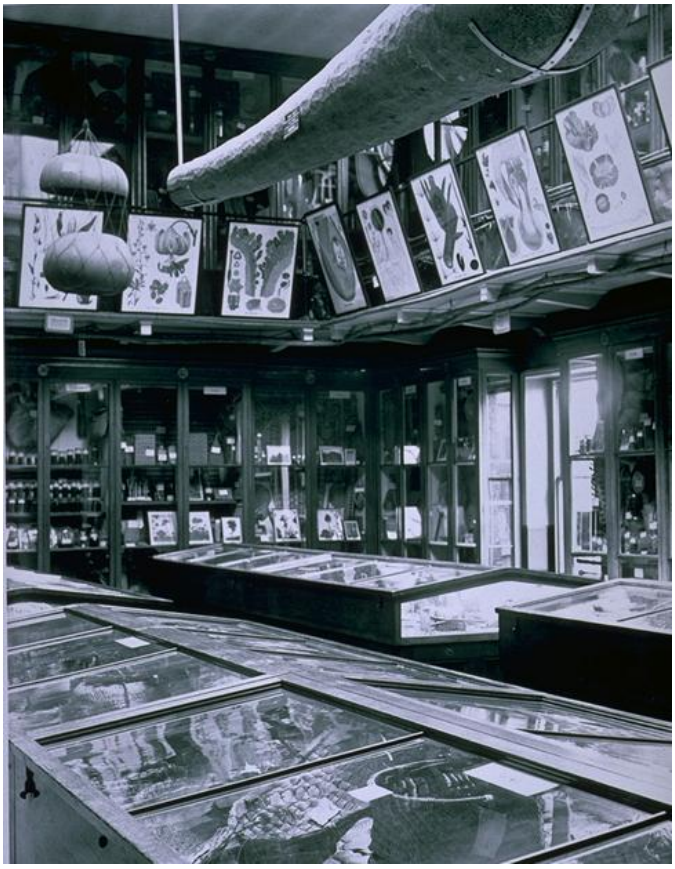


Figure 4.11 Diagrams suspended from the balcony of Museum No. 2 c.1900

KPI O-131 ©RBG, Kew

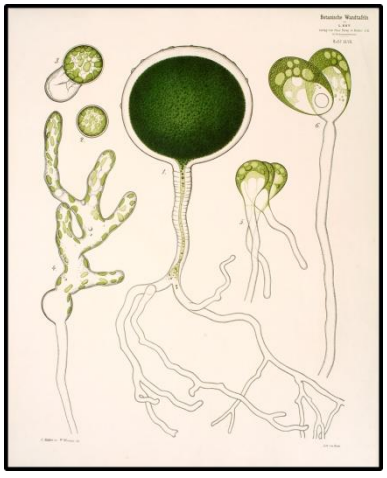


Figure 4.12 *Botrydium granulatum*

Source: Kny 1874-1911

Figure 4.13 *Chara fragilis* A. Brown (left); *Lilium Martagon* L. (right)

Source: Dodel-Port 1878-83

Figures 4.12 and 4.13 provided by the Delft School of Microbiology Archives, Department of Biotechnology, Delft University of Technology, Netherlands

Figure 4.14 Victoria and Australia Courts, 1862 Exhibition

Image PAC-10001952; courtesy of State Library of Victoria

Figure 4.15 'Aeta Palms *Mauritia flexuosa,* L. Maccasseema'

Photograph by Everard im Thurn 1880 ©RBG, Kew

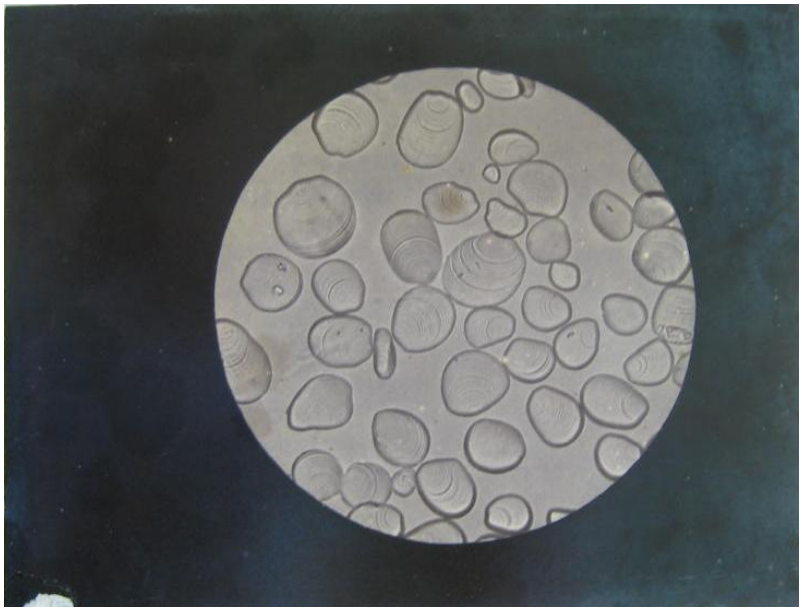


Figure 4.16 Photomicrograph of magnified grains of starch from *Canna indica*

Photograph by Edward Kinch 1888 ©RBG, Kew

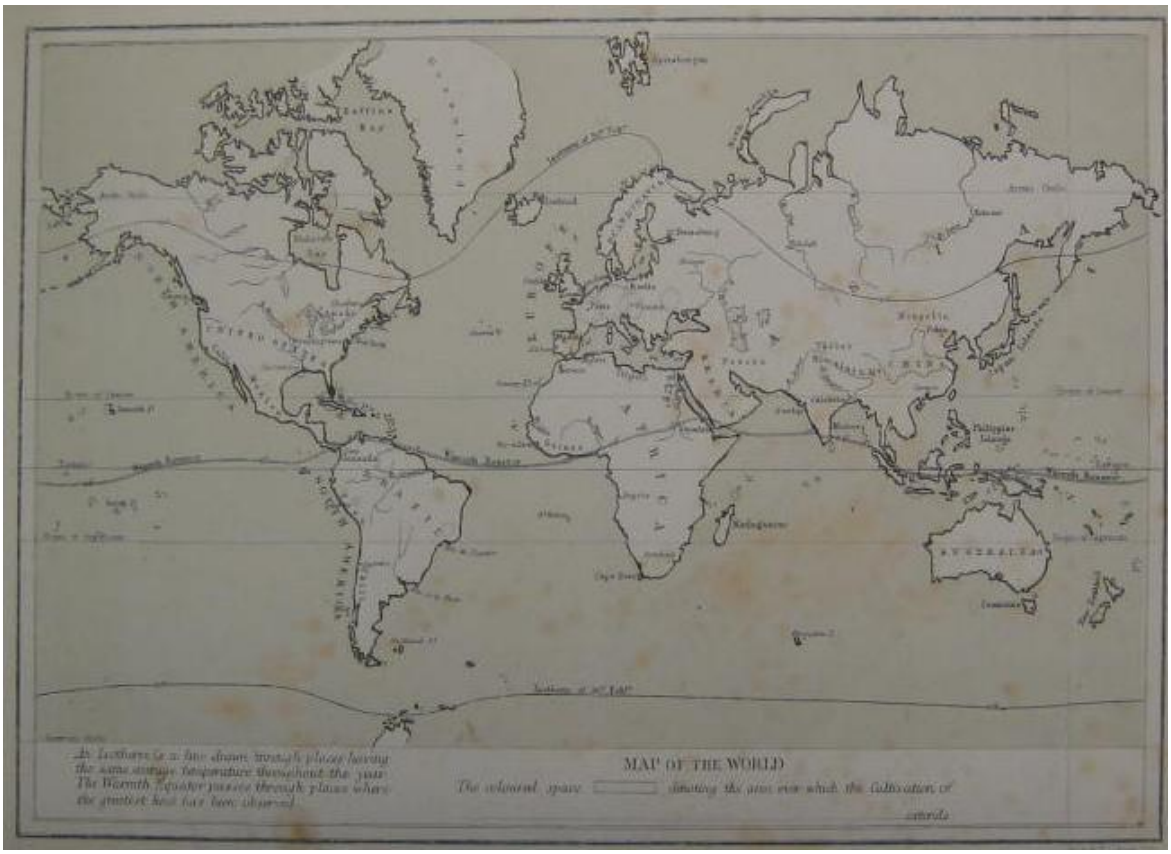


Figure 4.17 Kew Museum 'Map of the World'

The isolines represented are the isotherms of 30° Fahrenheit and the 'Warmth Equator'. The left-hand caption reads: 'An Isotherm is a line drawn though places having the same average temperature throughout the year. The Warmth Equator passes through places where the greatest heat has been observed'. The right-hand caption reads: 'The coloured space denoting the area over which the cultivation of _____ extends'.

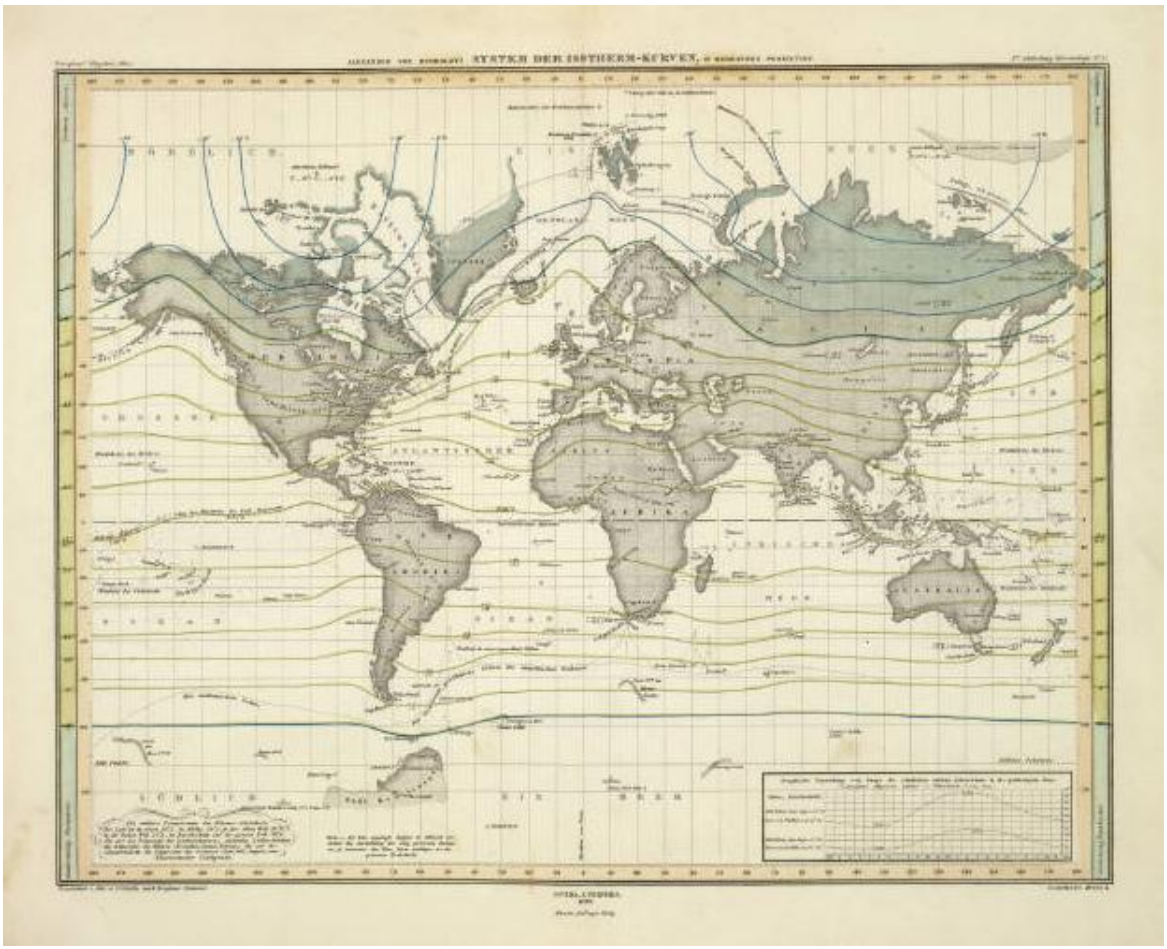


Figure 4.18 'Alexander von Humboldt's System der Isotherm-Kurven'

Source: Berghaus 1849 ©2003 Cartography Associates

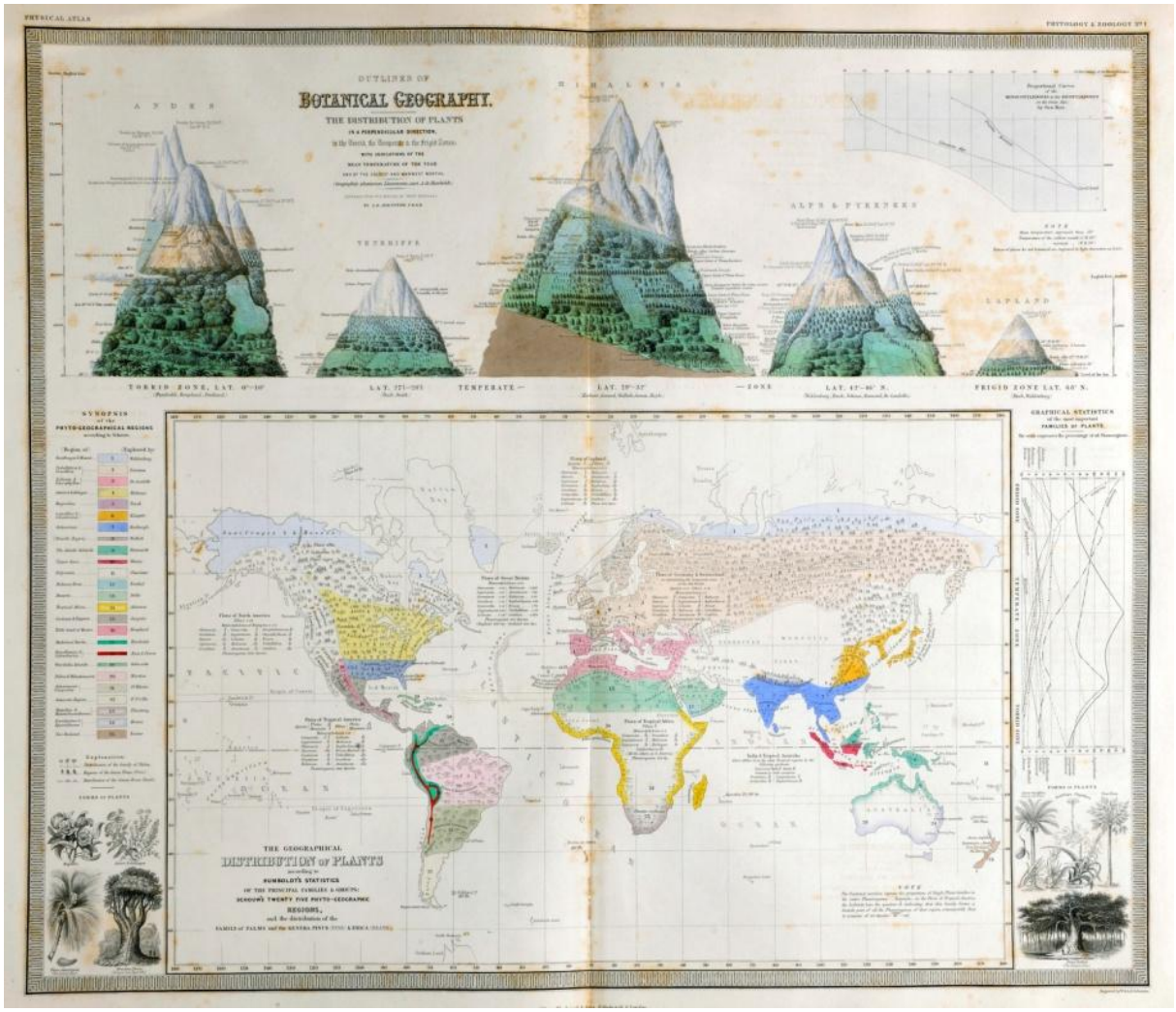


Figure 4.19 'The Geographical Distribution of Plants'

Source: Johnston 1849 ©2012 Princeton University Library

Figure 4.20 Mintorn wax roses c.1870

Photograph by A. McRobb ©RBG, Kew

Figure 4.21 Indigo factory model

©RBG, Kew

Figure 4.22 Indigo factory in Museum 1 c.1900

Photograph by E. J. Wallis; KPI W-441 ©RBG, Kew

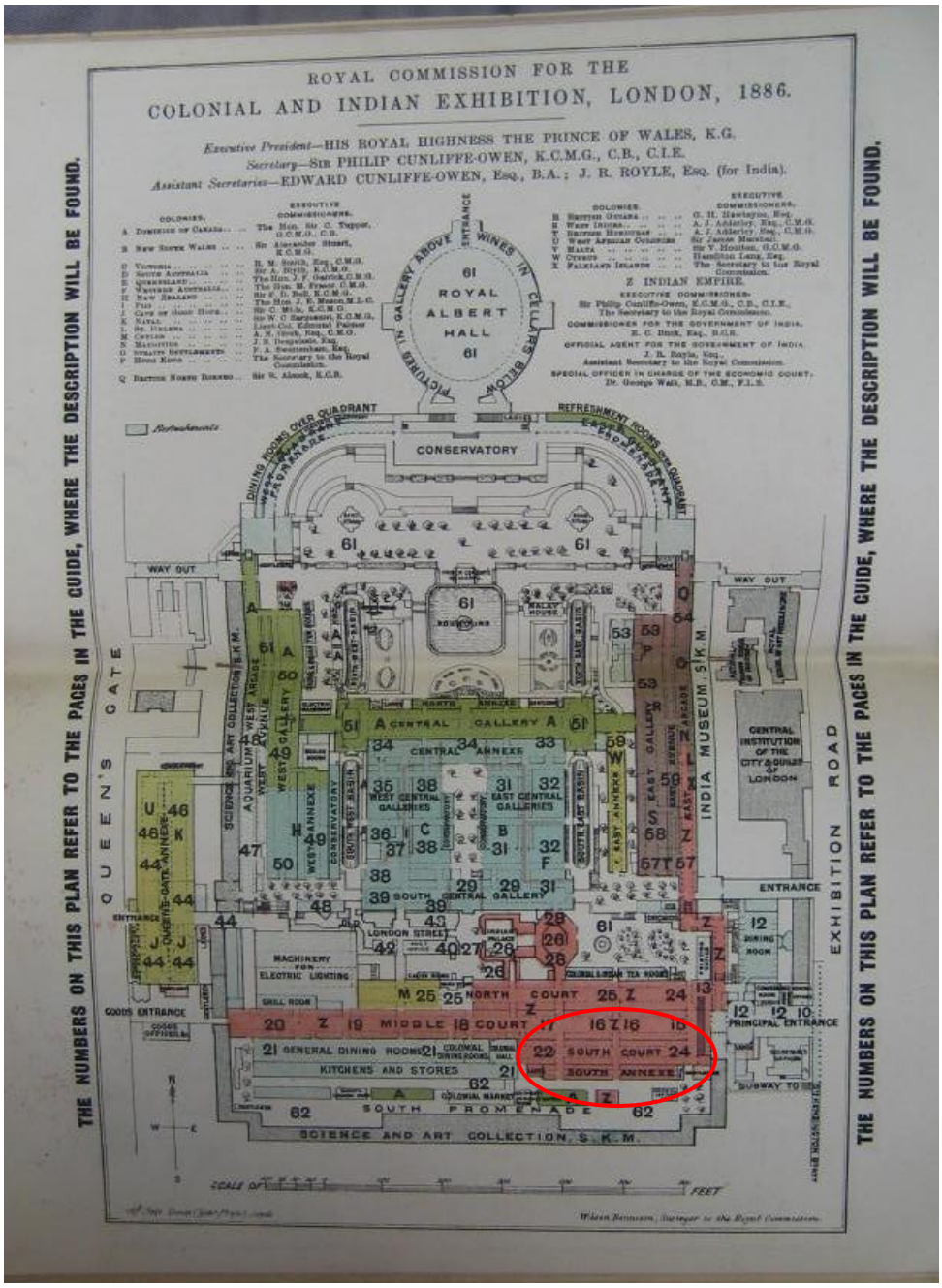


Figure 4.23 Plan of the 1886 Colonial and Indian Exhibition

Location of indigo factory model indicated

Source: C&IE 1886a; courtesy of the National Art Library

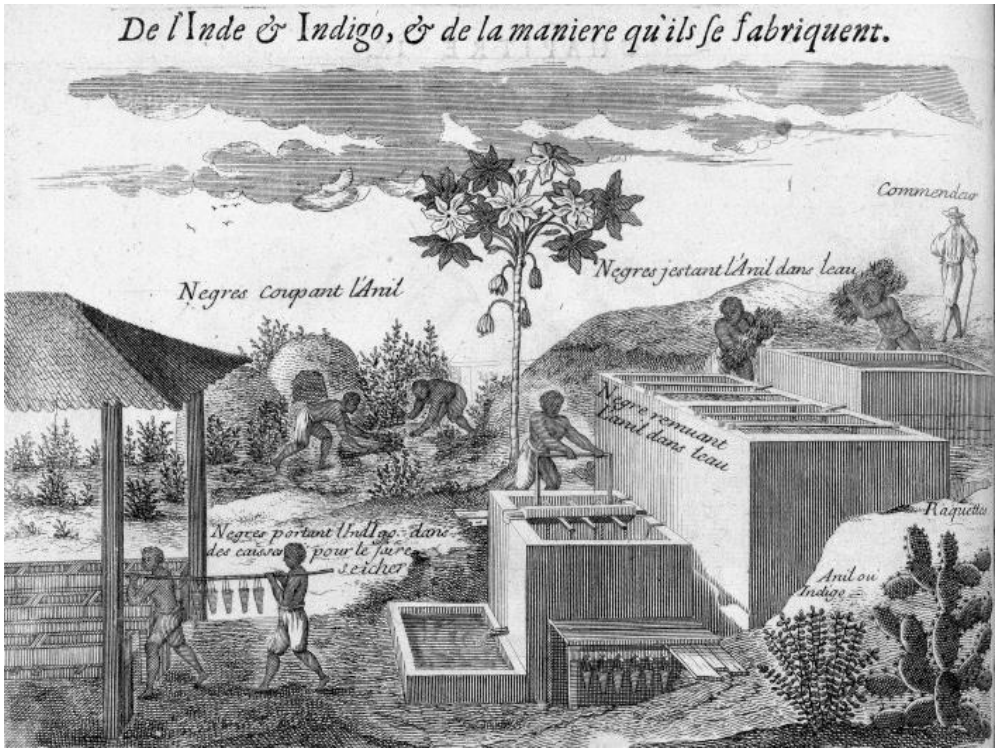


Figure 4.24 Indigo production in the French West Indies 1694

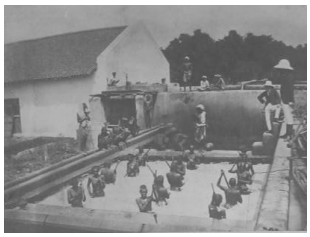
Source: Pomet 1694

Figure 4.25 'Indigo Manufacture in India' *The Graphic,* 4 September 1887

'Indigo factory, India'

'Ploughing'

'Seed sowing – the drills'*

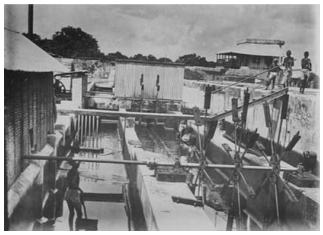


'Beating – old style'*

'Loading steeping vat'

'The beating-vats, showing froth'

'Pressing the slabs'*



'Beating wheel'

'Filtering table and boilers'

'Drying house'

'Filtering table and boilers'

'Cutting the cake into cubes'*

Figure 4.26'Indigo Manufacture' photographs in Museum No. 1

Original captions cited; order of images undocumented

*Malitte images

Figure 4.27 Indigo factory model – detail

CHAPTER FIVE

‘Instruction’

Practical geography and products of empire

In April 1914 David Prain, Director of Kew, received a letter from C. E. Chase, headmaster of the Boy’s Department of Gloucester Road School in Camberwell, south-east London:

> For several years I have endeavoured to teach a certain amount of Geography by means of an Exhibition of Products of the Empire, believing the children remember well things they see and handle. For this purpose I gather as many Natural and Artificial (Manufactured) objects as possible and for two weeks round ‘Empire Day’ I hold an Exhibition.
>
> The class rooms represent: 1. Homeland 2. Scotland and Ireland 3. Canada 4. Australia 5. India 6. West Indies 7. British Possessions Africa. Enclosed are photographs showing former exhibitions.
>
> I am attending the lectures and demonstrations by the Assistant Director of the Gardens – A. W. Hill Esq. and having had the privilege of seeing and handling a number of objects, know how valuable it would be to have such (and others) lent to me...
>
> Anything from India and our Colonies would be of use.

The photographs sent by Chase (Figures 5.1 and 5.2) testify not only to the enthusiasm of an individual teacher working in one of the relatively new Board

Schools,[1] but also to initiatives in the first decade of the twentieth century to promote 'the concept of a homogeneous national identity and unity within Britain' by mobilising the ideology of imperialism (Coombes 1994, 111). Empire Day, which provided the context for Chase's exhibition, was introduced in 1902. It was just one element in a range of activities – including exhibitions, jamborees, festivals, and pageants – which provided 'lessons in imperial geography' from the turn of the century to the Second World War (Ryan 1999, 119). Chase's displays, with their plant specimens, finished products, models, maps, botanical illustrations, and photographs, reflected the display ethos of the Museum of Economic Botany, which may have served as his inspiration. They also had something of the exuberance of international exhibitions with their use of posters and branded products sourced directly from manufacturers.

The letter is of broader interest insofar as it acts as a précis of the Kew Museum's involvement in school education from the late nineteenth to early twentieth century. It emphasises the importance accorded to 'object lessons' during this period. It demonstrates the usage of botanical collections in the teaching of imperial geography. It makes reference to the 'lectures and demonstrations' conducted at Kew in response to the report of the Devonshire Commission which had recommended 'practical instruction in elementary science' for teachers throughout the country.[2] And it introduces us to Kew's participation in the school museums programme and thus to the extension of the Museum of Economic Botany into the classrooms of Britain's schools.

In this chapter I am concerned with the involvement of the Kew Museum in projects of instruction, from its foundation in 1847 to the First World War. In

[1] Gloucester Road School had opened in 1875 (Margrie 1934, 292); Chase was Head Master from 1891 to 1921.

[2] 1871 [C.318] *First Report of the Royal Commission on Scientific Instruction and the Advancement of Science,* p.2

addition to pedagogical initiatives, in particular the Kew Museum's involvement with the Department of Science and Art (DSA) teacher training programme, this chapter also considers the facilitation of 'self-culture' (Smiles 1859) for trainee gardeners and forestry graduates. Whilst teachers, gardeners, and foresters appear at first glance as disparate audiences requiring differing methods and media of instruction, what they all shared through their involvement with the Kew Museum was privileged access to a particular assemblage of resources: museum objects 'beyond the glass case' (Merriman 1991); text books written by Kew scientists and/or based on the Kew Museum collections; and supervision by museum staff. These resources were deployed in a range of contexts which form the framework on which this chapter is structured, *viz.*: nineteenth-century ideas on elementary science education, self-improvement, and the popularisation of science. My argument here is twofold: that an instructive programme was essential to establishing the Kew Museum as a disciplinary site – a site suited to educational purposes; and secondly that instruction was understood in a specific way at Kew which dictated the shape of its programme. We begin by returning to the Lindley Report in search of the origins of Kew's programme of instruction.

According to Lindley, botanic gardens in Europe had traditionally been attached to universities. Yet London University, which had been founded in 1836, had no such dedicated, publicly-funded facility, despite there being an estimated 433 medical students attending botany lectures in the capital.[3] Furthermore, botanic gardens were generally acknowledged as national training institutions for gardeners – for positions at home and in the colonies – another purpose as yet unfulfilled by a British garden. And in words which

[3] The only botanic garden available to students was the Chelsea Physic Garden – 'a small garden...maintained by the funds of a private corporation' (1840 [292] *Botanical Garden (Kew). Copy of the Report made to the Committee appointed by the Lords of the Treasury in January 1838 to inquire into the Management, &c. of the Royal Gardens at Kew*, p.4)

considerably pre-dated the establishment of the South Kensington pedagogocracy, and which constituted a vigorous nod to the Whig Prime Minister, Lord Melbourne, Lindley suggested that Kew should be concerned in 'refining the taste, increasing the knowledge, and augmenting the amount of rational pleasures of that important class of Society, to provide for the instruction of which has become so great and wise an object with the present enlightened administration'. The instruction of the working classes, he continued, should take the form, not of a 'regular academical course', but of free lectures on botany 'in a popular form'.[4] To summarise, then, Lindley identified three targets for botanical instruction, each with different learning requirements: access to the Gardens' various collections for university students, technical instruction to train gardeners for posts in colonial gardens, and lectures for the general public. The common denominator was Kew's plant collections, which would both provide Kew with the authority to offer instruction and furnish the objects around which that instruction could take place.

Although its foundation was some years away, the Kew Museum was also to play a part in fulfilling Lindley's objectives, particularly in the facilitation of self-directed instruction for students of forestry, and in the training of gardeners. In addition it was to respond to new opportunities that arose in the latter part of the nineteenth century in relation to teacher-training and to the supply of specimens to elementary schools. Yet there was one element of Lindley's vision that was resisted throughout the long nineteenth century, and that was the provision of botany lectures to a general public. To account for this, we must first survey the landscape of science education in the nineteenth century and the position occupied within it by Kew and other museums.

[4] 1840 (292) *Op. cit.,* pp.4-5

1. Elementary science education and the object

> No modern educationalist will dispute the great advantage of tangible evidence. For instance, a botany lesson becomes clearer when given within actual sight of living plants growing at Kew; a geography lesson is more easy of comprehension when the products of foreign lands and models of aboriginal races are viewed in the British Museum; natural history and natural science become intelligible and delightful in the presence of animals, birds, and mineral specimens at South Kensington.
>
> Sudeley 1913, 1213

When Lindley wrote his report in 1838, science education at elementary level was only available to the middle classes and had not yet become a concern of state. Its provision was unevenly distributed and dependent on the orthodoxy adopted by individual schools. As the Devonshire Commission announced in its first report, 'before the year 1859 elementary instruction in science was scarcely attainable by the working classes'.[5] In 1859, however, mobilised by widely-expressed anxieties regarding Britain's technological status amongst the industrialised nations, the DSA originated a scheme to introduce science education into elementary schools. It was a two-pronged attack with the Department setting the syllabi for both science teacher training and elementary school science teaching. To encourage participation, a payment was granted to schools on behalf of every pupil who passed the science examinations.[6] The uptake of the DSA science curriculum increased significantly from 1870 when William Forster's act established local School Boards charged with the provision of elementary education for children between the ages of five and twelve (Stephens 1998, 79). However teachers were on a number of occasions criticized by DSA examiners – including Thomas Huxley – for being merely 'fluent repeating machines', and the teaching

[5] 1872 [C.536] *Royal Commission on Scientific Instruction and the Advancement of Science Vol. I. First, Supplementary, and Second Reports, with Minutes of Evidence and Appendices*, p.xix

[6] 1872 [C.536] *Op. cit.,* p.xix

method for amounting to no more than textbook cramming (cited in Forgan & Gooday 1996, 447).

Despite developments ensuing from the 1870 Elementary Education Act, the status of science education in Britain continued to preoccupy a scientific 'lobby' of academics, politicians, industrialists and learned societies. The RSA, the Royal Society, the BAAS, the 'Cambridge network' of scientists, and the 'X Club' were among those groups whose members published articles and gave evidence to official enquiries on the subject. As their number included salaried scientists and educators – perhaps most notably Huxley and Joseph Hooker – they were truly both movers and shakers, with the ability to implement changes from within, and to agitate from without. In 1866 a committee of the British Association which included Huxley delivered its own recommendations for a school science curriculum (BAAS 1867, xxxix). The Committee differentiated between scientific information – 'general literary acquaintance with scientific facts' – and scientific training – 'methods that may be gained by studying the facts at first hand under the guidance of a competent teacher'. The former category included 'the physical geography of the earth...the broad facts of Geology; of elementary Natural History, with especial reference to the useful plants and animals; and of the rudiments of Physiology'; the latter category consisted of 'Experimental Physics, Elementary Chemistry, and Botany' (1867, xxxix-liv). 'At first hand' indicated study directly from specimens; 'under the guidance of a competent teacher' hinted at a new experimental approach to science in which the student was encouraged to pursue her/his own lines of enquiry, and to acquire what Daston and Galison term 'trained judgement' (Daston & Galison 2007). This could not take place without a methodological shift in teacher training and in 1872 mass laboratory training for teachers was introduced at the Science Schools in South Kensington with a full-time programme convened by Huxley (Forgan & Gooday 1996, 448-449).

Huxley was also a commissioner on the Devonshire Commission from 1871 to 1875, and Joseph Hooker was among the witnesses called. In 1874 the Commissioners delivered their landmark counsel that natural science education 'ought to be made an *essential* part of the course of instruction in *every elementary school'*,[7] and that 'not less than six hours a week on the average should be appropriated for the purpose'.[8] As a result of the adoption of these proposals, science education in Britain was extended universally across the elementary sector: extended by age down to infant school pupils, by socio-economic status to the working classes, and by gender to include girls. What was to become most significant to Kew and other museums was the recommendation that the teaching of science should, where possible, be conveyed by object lessons.[9]

Object lessons

Object lessons have their origin in the 'natural education' school of thought, an approach emphasizing the importance of satisfying a child's natural instincts which can be traced back to the theories of Johann Heinrich Pestalozzi. But object lessons were of mixed lineage and a more recent ancestry can be found in the 'science of common things' which became popular in the 1850s. Leading proponents of English popular education such as James Kay-Shuttleworth believed this approach to science to be particularly suitable for working-class children (Lightman 2007a, 67). There were literally dozens of text-books published on the subject between the 1850s and the 1890s, generally the work of popularisers and written from the perspective of natural theology which dominated the early Victorian period (Lightman 1997, 187-211).

[7] Emphasis added

[8] 1874 [C. 1087] *Conclusions and Recommendations*, p. 10, ¶49.1

[9] 1872 [C.536] *Op. cit.,* p.xvi

In 1871 the School Board for London published a curriculum for junior and senior schools in which 'systematised object lessons, embracing, in the six school years, a course of elementary instruction in physical science' appeared under the rubric of 'essential subjects'.[10] The following year, the Devonshire Commission endorsed the use of objects in elementary science education on a national scale with the aim of 'aiding the general development of the children'.[11] By 1890 there were forty object lessons on the curriculum on subjects ranging from a sunflower to a felt hat (Anon. 1890, 350) (Figure 5.3). The opportunities for natural history teaching, and botany in particular, were manifold. In an object lesson plan on plant classification, for example, it was remarked: 'Children in London may have seen the water-plants at Kew, and should be asked to describe them' (Anon. 1885, 108). But among the prescribed objects were also those of the type exhibited in the Museums of Economic Botany. An object lesson plan for sugar is shown at Figure 5.4, the reference source for which was James Johnston's *Chemistry of Common Life* (Johnston 1867).[12] The Kew Museum guide-book also provided an account of cane sugar which is striking in its similarity to the lesson plan (Figure 5.5), not only the verbal content with its emphasis on 'the successive stages' of sugar production, but also the media used to deliver the message: various samples of sugar, raw and refined (Figure 5.6); plant specimens; and images. Whilst Kew had access to a range of pictorial materials from which to construct narratives in its Museums' spaces and guide-book pages, including oil paintings by prominent artists such as Thomas Baines (Figure 5.7), the most common sources used by schools were manufacturers and school suppliers. Nevertheless, a comparison

[10] 1872 [C.536] *Op. cit.,* p.xvii

[11] 1875 [C.1363] *Royal Commission on Scientific Instruction and the Advancement of Science. Vol. III. Minutes of evidence, and appendices; analyses of evidence; index to the eight reports (with their appendices) issued by the commission, and the general index to the evidence; to the analyses of the evidence; and to the appendices to the evidence given in Vols. I.—III,* p.xvi, ¶26

[12] Although Johnston's book was first published in 1855, it was almost certainly the 1867 edition, 'revised and brought down to the present time' by George Henry Lewes, which was used by the DSA.

of the two texts – from the DSA and the Kew Museum respectively – shows that from as early as the mid-1860s a shared language of economic botany was developing across popular texts and museums, later to be appropriated by the DSA, which combined diverse elements – plants, manufactures, images – to form new knowledge in a narrative of process and progress.

School museums

To facilitate curricular object lessons, schools were encouraged by their school boards to create school 'museums'. In the British teaching press, a school museum was defined by one contributor as 'a collection of objects as aids in teaching, formed by the joint exertions of teacher and scholar' (Anon. 1887, 265), and pupil participation in the process was a recurrent feature of the discourse on the subject. Generally it was advocated that the collection be housed in a glazed cabinet in the classroom, with the contents labelled and systematically arranged (Figure 5.8). Those contents were to include a combination of natural history specimens and 'specimens of raw and manufactured products in stages to illustrate the various industries of our land' (Anon. 1887, 265). Initially teachers were advised to write to local companies to acquire such products and over the following decade articles on school museums in *The Teachers' Aid* consisted primarily in lists of sympathetic manufacturers.[13]

Botany lent itself particularly well to the collection and preservation of specimens for schools. And in 1900 the Code of Regulations controlling the work of public elementary schools was again redrafted, with a greater

[13] *The Teachers' Aid: a Practical Journal for Assisting Teachers in the Work of their Schools and in their Private Study* was a 6-monthly periodical from the London-based Educational Newspaper Co. It was in publication from 1885 to 1925 and its chief purpose appears to have lain in advising elementary school teachers and pupil-teachers on the curriculum (Betts 1999, 29).

emphasis on nature study taught with reference to the immediate environment (N-SE 1903, 94). In 1905 the Board of Education's 'Suggestions for the Consideration of Teachers' attached increased importance to teachers' own skills of observation in the teaching of the natural sciences and to the role of the school museum (Yoxall & Gray 1905, 50-55). Schools took up the school museum idea enthusiastically; by 1906 one writer was able to claim: 'It is now generally recognized that the museum is a necessary part of the educational machinery of a school' (Latter 1906, 164). The school museum idea appears to have originated in Switzerland in the 'naturalistic and experiential' educational theories and practices of Pestalozzi and Philipp Emanuel Fellenberg. In Britain the concept was adopted initially by British private schools founded on the Pestalozzian-Fellenbergian model (Elliott & Daniels 2006). By 1864, in the process of a Royal Commission into the teaching in British public schools, masters from Shrewsbury, Westminster, and Rugby also made reference to their school museums, the latter emphasizing the contribution made to the collection by the pupils themselves.[14]

By the late nineteenth century, experiential theories were being applied to teaching practice in the new board schools. As the Devonshire Commission had reported in 1875 in an appeal to national pride, 'there can be no good reason why such Elementary Scientific Instruction as has long been given in the Primary Schools of Germany and Switzerland should not be bestowed upon English children'.[15] To Pestalozzi and Fellenberg were added the teachings of Friedrich Fröbel and Maria Montessori, and collectively these came to stand for 'natural' education – a teaching approach which advocated that education take its lead from the nature of children's activities, and that inherent curiosity

[14] 1864 [3288] *Report of Her Majesty's Commissioners appointed to inquire into the Revenues and Management of Certain Colleges and Schools, and the Studies pursued and Instruction given therein; with an Appendix and Evidence*. Vol. I. Report. Appendix, pp.314 & 326

[15] 1875 [C. 1363], p.xvi, ¶31

should be encouraged (Ploszajska 1996, 392). The botanical applications of this 'more active, interactive involvement with nature' were numerous (Sanders 2005, 46-47). In 1895 the Day School Code was redrafted to afford curricular provision for school visits to museums 'and other institutions of educational value'.[16] With the revised Code, the reach of object-based pedagogy was extended beyond the classroom. 'The museum ought to be an adjunct of the schoolroom, as it now is of the University lecture-room, and children should be trained to observe, just as they are taught to cypher or to swim', declared David Murray (Murray 1904, 259),[17] and *The Teachers' Aid* responded with a series of articles on how to take advantage of the new 'privilege' (Howard 1895, 121).[18] At the same time the recommendation was 'seized upon' by new museum professionals seeking to embed their museums in the public life of their communities (Alberti 2009, 162). Museum provision for schools took a number of forms: the entire museum could to dedicated to school children, as at Haslemere; museums might make available loan boxes to schools, as at Liverpool Museum (Alberti 2007, 377);[19] some museums, as was the case at South Kensington, arranged intramural instruction for teachers enabling them to use the museum collections to their optimum advantage; schools might use the services of museums to provide them with specimens for their 'school museums', as at Kew; and in a small number of cases, as at Manchester and Leeds, (Alberti 2009, 162) and at the Horniman Museum in London (Bailkin 2004, 176) curators and educational officers conducted in-house instruction for school groups. On the whole, however, the latter was a development which only really gathered momentum in the second half of the twentieth century.

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[16] 1895 [C.7776-I] *Report of the Committee of Council on Education (England and Wales); with Appendix*, p.314

[17] Murray's book – *Museums: Their History and Use* (1904) – was the first major history of museums in English.

[18] See also Anon. 1895a, 337-39; 1895b, 457-59

[19] Loan boxes had been a recommendation of the Devonshire Commission as early as 1872 (1872 [C. 536], p.xxx)

Pedagogy and the Museum of Economic Botany

The Museum of Economic Botany was among the ranks of those museums responding to the new pedagogical opportunities – opportunities that could not have been foreseen by Lindley. Long before the Devonshire Commission first sat, William Hooker had re-ordered Kew itself so as to meet the objective of 'instruction'. In his 1858 annual report he had stated that he found it difficult to report separately on the Herbarium, Library, and Museum, 'as they are all intimately connected with educational instruction, both of young and old, and with a scientific knowledge of the structure and uses of Plants' (Hooker 1859, 3). Consequently in 1860 he introduced a new operational structure consisting of three divisions: the 'Botanic Garden', the 'Pleasure Ground or Arboretum', and the 'Educational, Instructive and Scientific Department' (Hooker 1861, 1). The latter incorporated the Museum, the Herbarium, and the Library.

Although this department was not directly accountable to the DSA, it nevertheless responded to a number of South Kensington educational initiatives. The DSA proved to be essential to the Kew Museum's strategy of building economic botany as a discipline, and the two institutions co-operated in a number of ways. The Department, whose enduring priority was education, held and displayed collections which were every bit as heterogeneous as those at Kew; it also administered the South Kensington Museum, and the combined enterprise has been described as 'a school that had a collection to which the public was also admitted' (Robertson 2004, 4). The two museums exchanged objects; a particularly valuable addition to the Kew Museum collections was the Duke of Edinburgh's collection of 'robes, head-dresses, and pieces of cloth of Tapa or Paper Mulberry' in 1874 (Hooker 1875, 11).

People, too, were known to shuttle between Kew and South Kensington. In 1876 Kew's assistant director Thiselton-Dyer, who had previously worked as a

demonstrator in Huxley's teaching laboratory at South Kensington, was asked to lecture trainee teachers at the Normal School of Science. Subsequently he became the Department's examiner in botany, selecting specimens from the Kew Museum for the examinations which took place in centres across Britain. From 1885 the Department came to Kew when students from the advanced course were allowed to work under the Assistant Professor, Dr. Scott, in the Jodrell Laboratory.[20] There were, too, the 'lectures and demonstrations' taught by the Assistant Director and attended by, amongst other, the headmaster of Gloucester Road School, during which participants were allowed to examine and handle objects.[21]

Beyond teacher training, a further function of the DSA was the production of teaching aids, in particular 'improved diagrams' (Cole 1857, 19). John Stevens Henslow, an honorary Kewite, was one of the first contributors. Henslow's botanical diagrams were originally prepared to accompany his lectures at the South Kensington Museum in 1857. Henslow's approach to education is worth expanding on here because it is embedded in the Museum of Economic Botany – in its collections, its plant systematics,[22] its displays, and in a range of pedagogic engagements with the wider world. At his Cambridge botany lectures (1825-61), and later at the village school of Hitcham, Henslow had introduced innovations such as the use of coloured illustrations, the practical class and the demonstration bench. His emphasis throughout was on learning by observation:

> "How to observe" is an art to be acquired by "observing" and not by listening, or even by reading alone. The Student will find himself confused rather than enlightened if he will not take the

[20] RBGK Archives, MR/41 South Kensington Museum. Science and Art Department 1855-1912, ff.163, 181, 216

[21] Letter to David Prain 27 April 1914; RBGK EBC, School Museums Correspondence Vol. 3, f.830

[22] Henslow, like Hooker, was an advocate of Candolle's 'natural' system.

> trouble to examine plants, and to compare what he sees in them etc. (Henslow 1851, cited in Walters 1981, 51-52)

In 1870 the DSA published a series of seventy botanical diagrams by Daniel Oliver. These charts too were intended for 'Museums and Class-room use' (Hooker 1871, 7-8), indicating a common pedagogic mission between schools and museums, and a shared visual, as well as textual language of scientific instruction. The Department had the authority to subsidise the cost of such diagrams to poorer schools to the tune of 40%, and in the first five years of the grant being available, 1,500 schools were assisted in acquiring wall-charts (Cole 1857, 19). Both Henslow's and Oliver's charts were drawn by Walter Hood Fitch, Kew's principal illustrator, and so the Kew way of seeing plants was further extended to schools via this medium.

The systematic approach of these wall charts serves to underscore the 'scientific' rather than 'economic' orientation of the elementary schools botany syllabus, in its tendency towards the traditional areas of plant identification, classification, and dissection (DSA 1888).[23] In this is felt the influence of Joseph Hooker and his professional côterie, not only through their lobbying and consultative roles, but also through their publications for the school sector, which have been unflatteringly described as 'the overtly propagandist products of the science lobby' (Cooter & Pumfrey 1994, 237). They were not writing autonomously however; one must also consider the role of publishers in the process. Macmillan, who published Joseph Hooker's *Botany* (1876) as part of the Science Primer Series, was a 'major power broker in the world of scientific publications', and it was publishers who decided who wrote text books for the

[23] The botany syllabus referred to is distinct from the list of approved object lessons which constituted a different part of the curriculum.

public, not practitioners (Lightman 2007, 30).[24] Amongst those texts recommended for the teaching of the DSA curriculum were Daniel Oliver's *Lessons in Elementary Botany* (1870); Hooker's *Botany* (1876); and George Henslow's *Floral Dissections* (1879) and *Botany for Children* (1888) (DSA 1888; Anon. 1886b, 580).[25] It comes as no surprise then, that elementary botany teaching took on a distinctly Kewensian complexion in the last quarter of the century but this was to extend beyond the printed word and image via the medium of the school museums project.

Amongst the documentation kept alongside the EBC are two volumes of letters dating from 1877 to 1914 which act as an archive of the Kew Museum's involvement in this most fascinating collaboration between the museum and school sectors. The letters, mostly from head teachers, both requested and acknowledged receipt of botanical specimens for their school museums. While a wide range of schools was represented, the single largest sector was the Board Schools (Figure 5.9). We have already observed how the London School Board was ahead of other boards in introducing object lessons into its elementary schools. Similarly it led the field in the organisation of school museums in those schools under its jurisdiction, and from 1877 an arrangement existed between Kew and the London School Board, known as the 'Botany Scheme', by which duplicate museum specimens from Kew were sent to the Board's store at the Store Yard in Hyde Park to be distributed to schools across the capital.[26]

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[24] This series of elementary science textbooks was devised by Alexander Macmillan in direct response to the Education Act 1870. Huxley was one of the co-editors and wrote the introductory volume (Lightman 2007, 388-397).

[25] George Henslow was the son of John Stevens Henslow, and his educational works built largely on the model established by his father.

[26] Letter to David Prain from the London School Board, May 31, 1900; RBGK EBC, School Museums Correspondence Vol.3, f.823 (see also f.826)

In 1894 there was a huge surge in demand, with requests solicited from across Britain (Figure 5.10). The reason for the increase lies partly in an article published in *The Teachers' Aid* in May of that year. The journal had regularly featured articles with such titles as 'How to obtain free specimens' and 'A new list of specimens', which were essentially lists of companies who would supply products to school museums on request (Anon. 1894a, 389; 1894c, 269-70). However, by 1894 the 'specimens innumerable and literature unlimited' sent by manufacturers were proving harder to elicit, and 'the signs...[were] not lacking that the tide of free specimens...[had] begun to ebb'. The May article, therefore, in revealing that the author had recently received a large donation of botanical specimens from Kew Gardens, opened up to teachers a new seam of botanical supply. The author wrote of his new acquisitions: 'They represent a small museum in themselves, and are most valuable, consisting as they do of seeds, fibres, beans, and vegetable curios from all parts of the world' (Anon. 1894b, 169). 'From *The Teachers' Aid* I find that you grant educational help in the way of plants, fibres, seeds, &c. to schools,' wrote the headmaster of the Nant Peris Board School, Llanberis, Carnarvon within the same week that the article appeared.[27] Those schools which subsequently applied to the Kew Museum for specimens were mainly elementary, ranging from Board Schools, through National and British Schools, to Church Schools. Their geographical profile can be seen at Figure 5.11. There was a range of applications from across the London Boards, with a particular emphasis on what are now the inner London boroughs. Beyond the capital, there was a demand for specimens across England and Wales, with both urban and rural areas well-represented in the data. Requests from teachers in Scotland and Ireland were sparser,

[27] Letter to David Prain from Nant Peris Board School, Llanberis, Carnarvon, 25 May, 1894; RBGK EBC, School Museums Correspondence Vol.3, f.148

reflecting both the regionalised readership of *The Teachers' Aid* and the different education systems in those countries.[28]

Economic botany and imperial geography

Chase's letter to Kew, with which this chapter began, outlined his aim, `to teach a certain amount of Geography by means of an Exhibition of Products of the Empire', in the belief that 'children remember well things they see and handle'. This, too, had been the ethos of a Privy Council Committee of 1874 into instruction in physical geography, which had recommended that students should 'acquire geographical knowledge by means of the eye', rather than learning by rote (cited in Ploszajska 1996, 389). Huxley's *Physiography* (1877), which was to revolutionise the teaching of geography in Britain, similarly argued that 'the fundamental principle was to begin with observational science, facts collected; to proceed to classificatory science, facts arranged; and to end with inductive science, facts reasoned upon and laws deduced' (cited in Stoddart 1975, 20). Huxley saw geography as 'the peg upon which the greatest quantity of useful and entertaining scientific information can be suspended' (Huxley 1893, cited in Stoddart 1975, 24-35), and thus as the ideal route into the teaching of physics, chemistry, geology, zoology and botany. It is in large part due to the adoption of his ideas that botany and geography appear so often as aspects of the same subject during the late nineteenth century. Huxley's method in *Physiography*, which starts with the field study of the local environment, and moves gradually to the distant and unfamiliar, was an adaptation of Carl Ritter's *Heimatskunde* principle which had long been deployed in German education (Stoddart 1975, 23).

[28] Enquiries into the existence of similar schemes involving the Dublin and Edinburgh botanic gardens have yielded no results.

An influential advocate of Huxley's ideas was Keltie, who was appointed as Inspector of Geographical Education to the RGS in 1884. The Keltie Report of 1885 led to increased calls for object lessons in the teaching of geography (Ravenstein 1886, 166). Objects of plant origin recommended themselves as geographical teaching aids with regard to the study of climate, relief, and vegetation, in short to 'the facts of Nature which are the real subject of study' (RGS 1903, 129). But they also had a role in the teaching of human geography:

> A boy more easily remembers the names of Lyons and Coventry if he is shown at the time a sample of raw silk containing the dried cocoon and the dead body of a silkworm. The same with cotton, sugar, iron ore, cork, &c. (Anon. 1887, 266)

And economic botany also had the advantage of being accessible to urban children, as the RGS explained in its geography syllabus of 1903:

> Then town children know that things are bought in shops, and that some of these – eggs, milk, butter, flour, fruit – come from a distance; and even London gardens and parks may assist in giving them some idea of the different aspect presented by the districts in which such things are produced from that of the town in which they are sold (RGS 1903, 130).

This appeared to counter accusations that *Heimatskunde* was better adapted to 'some remote village, lost in the Black Forest', than to schools in the industrial cities (Kropotkin 1893, cited in Stoddart 1975, 23). Furthermore, there was an imperial strand to the conflation of botany and geography: biogeographical knowledge was seen as an integral part of imperial citizenship, on which much of the curriculum was predicated from the 1870s to the Second World War (Ploszajska 1999). Ritter's comparative method, whilst encouraging pupils' powers of observation, resulted almost inevitably in a 'patria-centric' gaze which disadvantaged colonised territories, and created a world vision which

had the *Heimat* firmly at its centre. The 'new geography' called for by Keltie was inflected with 'the new imperialism' (Hudson 1972).

Halford Mackinder, who followed in Keltie's footsteps, advocated the concept of 'visualisation', by which distant places and large concepts were to be made comprehensible to elementary school pupils. This too owed a debt to Ritter, and furthermore was intimately bound up with notions of imperial stewardship (Blouet 2004). It presented world geography 'from the British standpoint, so that finally we see the world as a theatre for British activity' (Mackinder 1911, 83). Mackinder's own preferred medium for rendering visual the territories of empire was the image rather than the object, particularly the lantern slide, and his nine-year term with COVIC was spent in producing sets of lantern slides 'to instruct the children of Britain about their Empire and the children of the Empire about the "Mother Country" ' (Ryan 1994, 157). Throughout his career Mackinder yielded considerable authority in the shaping of the schools' geography syllabus and his effect on the promulgation of 'concrete' teaching methods in general (Mackinder 1911, 82) was immense.

But extra-curricular organisations also had a part to play in the conflation of empire, geography, and botany peculiar to this period. In 1903 the League of the Empire was founded to bring children and teachers from around the British Empire into a dialogue. Museums played a key role; the League's 'School Museum Committee' included representatives from national and regional museums (Coombes 1994, 126). The paraphernalia of economic botany display – plant specimens, finished goods, maps, illustrations and photographs – provided an immediate means of visualising the bounty of empire for elementary school pupils. Chase's exhibition was doubtless a response to the imperialist turn; according to the Gloucester Road school's chronicler, the pupils were 'trained to value citizenship of this great Empire' (Margrie 1934, 298). This might take the form of ceremony: in 1908 on the King's birthday,

Chase presided over a ceremony of flag exchange with a school of Camberwell Town in Australia (1934, 296-301). But it also extended into the daily teaching of the geography curriculum through the 'products of Empire'.

In this section, we have been concerned with school education at elementary level. However, government action at this level did not, at least in the short term, address the issue of an adult working population with little scientific or technical understanding of manufacturing. Nineteenth-century adult education was a fragmented field, with a range of providers supported by charities, endowments, members' subscriptions and, increasingly in the second half of the century, the state. Adults could access scientific knowledge in three principal ways, according to their needs and aspirations: matriculation – registration at an institution permitted to teach according to a syllabus set by a recognised board and leading to an examination; technical instruction, equating to vocational 'on-the-job' training; and popular instruction. The first two of these are best understood in the context of nineteenth-century ideas on self-improvement, whilst popular instruction needs to be considered against the background of public science initiatives from the mid-century. In the following section, I focus specifically on the role of the museum in technical instruction, notably Kew's approach to the training of gardeners, and to the facilitation of self-instruction for forestry graduates.

2. Self-improvement

> It is no doubt manifest, that the people themselves must be the great agents in accomplishing the work of their own instruction. Unless they deeply feel the usefulness of knowledge, and resolve to make some sacrifices for the acquisition of it, there can be no reasonable prospect of this grand object being attained.
>
> Henry Brougham 1825

In the nineteenth century, that technical instruction which was organised and funded by employers tended to be wholly practical in nature and occurred overwhelmingly in the workplace (Stephens 1998, 139). This was not only considered a more cost-effective solution by advocates of free enterprise but, according to the experts who testified to the Royal Commission on Technical Instruction during the 1880s, one that was superior in its delivery (1998, 140). 'This we do know,' wrote Shaw, Jardine & Co. of the Butler Street Mills in Manchester:

> that the most successful in our businesses are those who from early practical training became thoroughly acquainted with the working of machinery and the best application for ensuring the most economical working, coupled with the best results (in point of quality) from the material in process of working. Men otherwise ignorant are often the most successful and it too often happens that young men of education, without the practical training referred to fail in coming to the front.[29]

Nor was this a view held solely by industrialists; in 1877 Huxley informed the London City and Guilds: 'I do not believe in Trade Schools unless they are established in direct communication with large factories ... [for] the persons interested in the trade of a locality are best fitted to judge of its wants' (cited in Forgan & Gooday 1996, 456). But aside from arguments of economy and efficacy, the issue of training played directly into notions of self-help, as

[29] 1884 [C.3981-II] *Second Report of the Royal Commissioners on Technical Instruction,* Replies by Manufacturers to a Circular issued by the Commission, p.661

indicated by the words of Brougham above. Scientific instruction, in the form of prescribed courses leading to external examinations, such as those set by the DSA, was left to individual initiative;[30] indeed, the very acts of matriculating and passing an examination were viewed as proofs of character. It was the 'studiously disposed and most intelligent of workmen and apprentices' who availed themselves of the DSA classes,[31] and those, of course, who aspired to social advancement. Furthermore, as Peyton & Peyton of Birmingham observed, since the knowledge gained served the purpose of training the mind, this had positive benefits in the workplace:

> The advantage is not limited to the precise knowledge derived from their studies, but is perhaps of equal value as a mental training. Anything which leads them to observe and to think, so as to apply their knowledge to their various occupations, is of the greatest possible value.[32]

It comes as no surprise, therefore, that the Kew gardeners were trained along similar lines. The training of gardeners at Kew for British overseas territories had been instigated by Joseph Banks (Drayton 2000, 108), but had lost momentum after his death. Lindley had criticised the Royal Gardens collectively for having no system of producing gardeners 'for the Nation', and Kew in particular for not adequately labelling its living plants for 'the instruction of the gardeners in employ'.[33] Establishing an apprentices' programme was one of William Hooker's first priorities in assuming his post at Kew. In 1841 he founded the Gardeners' Library and Reading Room (Desmond 2007, 206). It held works on horticulture, elementary botany, geography, and

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[30] The most widely-taught syllabi were those of the RSA from 1856, the DSA from 1859, and the City and Guilds from 1879 (Laurent 1984, 590).

[31] 1884 [C.3981-II] *Second Report of the Royal Commissioners on Technical Instruction,* Replies by Manufacturers to a Circular issued by the Commission, p.645

[32] 1884 [C.3981-II] *Op. cit.*, p.646

[33] TNA PRO WORK 6/297 *Report of Committee on Expenditure and Management of the Royal Gardens. Vol.1,* pp.7-8

physics, agricultural chemistry, landscape gardening, voyages and travels, together with maps, and was open every evening after normal working hours (Hooker 1859). Hooker's inspiration almost certainly came from the model established in mechanics' institutes of a community-based library where fellow workers could meet and share knowledge. In 1871 Joseph Hooker introduced the Kew Mutual Improvement Society as an additional source of 'self-culture' for the gardeners. As early as 1825, educational reformer Brougham had counselled on the importance to working men of an opportunity to meet, 'one or two evenings in the week...and obtain all the advantages of mutual instruction and discussion' (Brougham 1825, 8). The Kew Society provided a forum for student gardeners to deliver papers to their peers, offering opportunities for writing, debate, and public speaking which would no doubt prove useful in their future careers as gardeners of empire.

But how did gardening apprenticeships concern the Kew Museum? Its involvement began in 1859 when Daniel Oliver began lecturing gardeners in botany, chemistry and meteorology. The lectures were not compulsory and they took place in the evenings but a reported three quarters of gardeners attended. By 1879 they had become 'part of the routine of the establishment' (Hooker 1879, 5). Under Joseph Hooker the range of taught lectures was expanded to include 'elements of structural, systematic, and physiological botany; of chemistry, physical geography, and meteorology in their application to horticulture; of economic botany, forestry, &c.' (Hooker 1875, 2). The subject matter dictated which Kew officer would deliver the lecture; lectures on economic botany were given by museum staff and are known to have taken place in the Museums (Figure 5.12). The lectures were to further enhance Kew's reputation as a disciplinary centre; in 1898 the French journal *L'Éclair* described Kew as 'une université de jardinage' (cited in McCracken 1997, 79).

However, as Thiselton-Dyer was to affirm, the library and lectures were in themselves unlikely to produce good gardeners; that could only be achieved through working in the glasshouses 'under the skilled direction of able foremen'. Here he referred to the tacit skills acquired through imitation, but also to the spirit of enquiry and experimentation provided by direct engagement with plants, and tempered by trained judgement. The advantage of the library and lectures was one of 'stimulating and developing their general intelligence' in order to grow as horticulturalists:

> It is this temper which we try to encourage at Kew. A man may know the rudiments of his art, and never be anything better than a journeyman. But if he begins to ask the why and the wherefore, then he is on the high-road to become a first-rate workman. And I know no art which affords a larger scope for the exercise of a lively intelligence than horticulture. The whole method is essentially scientific without making any profession of being so (Thiselton-Dyer 1892, 42).

The Kew 'method' of instruction was scientific because it incorporated reliable methods for the discovery of new truths – 'the why and the wherefore' – and this was an important element of Kew's construction of economic botany as a discipline. Thiselton-Dyer's words formed part of an argument he penned when invited by Middlesex County Council to deliver popular lectures in horticulture to 'the inhabitants of Middlesex who may care to avail themselves [of them]' (Thiselton-Dyer 1892, 41). His reasons for declining the invitation shared much in common with the views of the Manchester mill-owners questioned by the Royal Commission for Technical Instruction: horticulture, as a technical subject, was not one suited to the lecture theatre, but to practice and observation, thus requiring a sustained commitment over an extended time period. To attempt a short-cut to horticultural knowledge through books or periodic lectures would be mere 'intellectual indolence' (1892, 42). On this industrialists and scientists appeared to be of one accord. Thiselton-Dyer

included in the article an extract from Huxley's letter to the *Agricultural Gazette* in which the latter expressed similar views regarding agriculture, particularly the notion that 'practice is only to be learnt by practice' (cited Thiselton-Dyer 1892, 44). Affording opportunities for practice under supervision – scientific training – was the responsibility of the employer. Factual knowledge – scientific information – was to be gained by the personal exertions of the individual.

It was not only the working classes who sought to improve their prospects through the acquisition of scientific knowledge. At Kew, forestry graduates sought out Kew's Museum collections, looking to complete their sylvicultural education before heading off for colonial reserves and gardens.

Forestry training and the Kew Museum

In 1887 Joseph Hooker, now retired, was called as a witness to the Select Committee on Forestry. He was asked whether anything could be done at Kew to train land agents and bailiffs in British forestry and he replied that Kew could offer an elementary training in botany and instruction in such matters as timber diseases, particularly in light of the 'large collection of instructive specimens illustrating injuries to timber produced by fungi, insects, &c.'[34] He revealed that there was at Kew a pre-existing arrangement with the Royal Indian Engineering College at Cooper's Hill whereby students preparing to enter the Indian Forest Department received some instruction in the Gardens and Museums, supplemented by self-directed study of the Museum's timber collection. In fact, as alluded to in Chapter Four, from the early 1870s, Kew had received requests from the Department for graduates of Nancy and other forestry schools to have access to study the Kew collections before leaving for

[34] 1887 (246) *Report from the Select Committee on Forestry; together with the proceedings of the committee, minutes of evidence, and appendix*, ¶2204-2206

India.[35] The Nancy course was at the centre of a scheme to train British imperial foresters and ran from 1867 to 1884, when forestry training in the English language was introduced at Cooper's Hill. The Kew scheme was a purely voluntary one, taken up by students who wished to fill in particular gaps in their knowledge. Armed with Stewart's *Forest Flora* (Stewart 1874), they set to studying the timber displays and reading works on Indian botany in the Kew Museum library. It is understandable that Kew's timber collections were the most extensive in Britain and therefore of the greatest value to would-be foresters, but why did forestry graduates require additional instruction in botany? It appears that the entrance competition for Cooper's Hill required a candidate to take three compulsory subjects and two optional, of which botany was optional. On the course, the various subjects, including botany, were 'grouped in certain main branches' with the candidate being required to obtain only 'a fixed minimum of qualification' in each branch to obtain the College diploma in forestry. As Thiselton-Dyer had earlier pointed out to the India Office, this meant that a graduate could become an Assistant Conservator with only 'a very slender equipment of botanical knowledge' and he raised the apparently appalling spectre of 'the native subordinate officers who are trained in India itself at Dehra Dun receiv[ing] a better training in practical botany than the Europeans they afterwards serve under'.[36] Probationers could avoid this shortfall through their own 'diligent and persevering effort' (Smiles 1859, 30), combined with access to the Kew Museum's collections, library, and officers.

[35] Edinburgh and Cooper's Hill are also mentioned.

[36] Letter to Lord George Hamilton, India Office, 22 January 1900; RBGK Archives, MR/181 Dehra Dun Forest School, Volume 1 1866-1913, ff.115-118

3. Museums and the popularisation of science

> Happily, Botany is not now, what it was a century ago, – a dry study, mainly employed to determine the names, or a few medical virtues, of Plants. A desire on my part, as Director, to popularize the science, and to render it generally available, has been approved and encouraged by the several First Commissioners, in a way which cannot fail to be of service to all classes of society.
>
> William Jackson Hooker 1856, 2

Hooker's comments from his 1855 annual report highlight his wish to popularise botany by offering both physical and intellectual access to the Kew collections. The Museums were the primary instrument envisaged to deliver this objective through their 'instructive' displays. But beyond Kew, a common museum response to calls for providing scientific education was in the form of popular lectures delivered by curatorial staff or guest speakers. This practice emerged around the mid-century point, and by the second half of the century it was the norm for new museum buildings to incorporate lecture theatres (Forgan 1994, 152). In the provincial museums too, according to the 1887 BAAS committee investigating them, the more frequent route adopted was 'popular scientific lectures' (BAAS 1888, 125). The Museum of Practical Geology was the first national museum to do so. Its premises on Jermyn Street incorporated a large lecture theatre (Forgan 1994, 152) and this provided the setting for a series of evening lectures illustrating the Museum's collections (Figure 5.13). Considerable efforts were made to target the programme at the working classes. The mechanics' institutes had received criticism for gravitating towards the middle classes (Shapin & Barnes 1977, 34) and to safeguard against the same, the Museum could refuse entry to those other than 'working men and...the matriculated students of the institution'. The first series of lectures gives an indication as to the breadth of the offering:

> 'Glass' by Dr. L. Playfair; 'The reason why fossils are collected and exhibited' by Professor Forbes; 'Photography and its applications' by Professor Robert Hunt; 'Explanation of Geological Maps' by Professor Ramsay; 'The Occurrence of Metals in Nature' by Professor Smythe; and 'Iron' by Dr. Percy' (Anon. 1852, 162).

Huxley, who was a lecturer in natural history at the School of Mines from 1854 to 1872, was another speaker popular with this audience (Laurent 1984, 592). The account given in the *Illustrated London News* of these lectures suggests an active engagement on the part of the audience. These 'artisans' paid six pence for a series of six lectures, came armed with pencils and paper, and 'were busily taking notes throughout the lecture; thus showing that they rightly understood the object – to give them instruction, and not merely amusement' (Anon. 1852, 162). With Huxley, the museum also travelled to the people; two of his best-known lectures, 'On a piece of chalk' and 'What is to be learned from a piece of coal', were given to audiences of working men in Norwich and Leicester in 1868 and 1870 respectively (Stoddart 1975, 18).

Public lectures also formed a central plank of the South Kensington Museum's educational programme from its inauguration in 1857. Henslow was among the first cohort of speakers. [37] A number of Kew officers also contributed to the Department's public lecture programme; in 1870, for example, Daniel Oliver delivered a series of ten lectures on botany for women in the Museum's lecture theatre.[38] The lectures were based on Oliver's *Lessons in Elementary Botany* (1864) and this provides another example of the enduring impact of Henslow on the Kew Museum and its pedagogical approach. *Lessons* had been written to

[37] V&A Archives, VA280 ED84 Lectures and Use of Museum 1886-1956, ED84/35 Précis of the Minutes of the Science and Art Department, arranged in chronological order from 16th February to 1st July 1863, Lectures, Educational, (H22) 20 August 1857, p.184

[38] RBGK Archives, QX 88-0008 Notebooks on Economic Botany Lectures at Kew, *Instructions in Science and Art for Women: Notes of Ten Lectures on 'Botany' delivered by Professor Oliver FRS, &c., in the Lecture Theatre of the South Kensington Museum during March and April 1870*

promulgate Henslow's methods for teaching botany and included Henslow's plan of selected types, and his use of 'schedules' (Oliver 1864, vi). The 'flower schedule' was designed to direct the student's attention to the most important parts of the plant structure in order to identify species (Figure 5.14). Oliver's book and lectures are examples of what Anne Secord describes as a 'circuit of knowledge' in which popular science writers could train 'competent and reliable observers' to record their observations such that they could be 'consumed' by experts. Botany books like Oliver's were often produced with spaces to encourage their owners to keep records and to 'shape their way of seeing the vegetable kingdom by underlining the importance of scientific arrangement'. They were effectively 'performative spaces' (Secord 2011, 283-310).

Oliver's published lectures beg the question as to why Kew did not introduce a popular lecture series of its own, and why, indeed, a number of Kew directors withstood pressures to offer a similar programme at the Royal Botanic Gardens. The issue at Kew was certainly not an absence of demand from above or below. In 1853 the First Commissioner of Works – Sir William Molesworth – suggested a course of summer lectures for the apprentice gardeners to which the public could also be admitted.[39] Nothing came of his suggestion until 1859 when Daniel Oliver commenced his series of lectures to the trainee gardeners (Desmond 2007, 206), as discussed in the previous section. Eventually the lectures came to the attention of local residents who applied to be admitted, 'which, in all cases, have been refused' (Hooker 1875, 5). Joseph Hooker's view was that the success of the lectures hinged on the individual attention the gardeners received from their instructors, and that they might feel reluctant to ask questions in the presence of an external audience. He thus constructed his 'consumer community' for the lectures (Whitehead 2009, 73) as apprentice gardeners, rather than a more general public. The 'lending' of Kew staff like

[39] It will be remembered from Chapter Two that Molesworth was also responsible for bringing about Sunday opening of the Gardens in 1853 (Desmond 2007, 364).

Thiselton-Dyer to lecture at South Kensington suggests, not an aversion to popular instruction *per se,* but a view that institutions other than Kew were best suited to deliver it.

Lindley's 1838 call for 'gratuitous Lectures...upon Botany in a popular form' was raised again in the Second Report of the Devonshire Commission (1872). Joseph Hooker, when asked whether he thought it possible that Kew Gardens officers could give public lectures alongside their other duties, replied: 'I think it would be possible for certain able and active officers to do so, but I think that it would be highly inexpedient to require it of them'. Kew staff were 'abundantly occupied' with 'the business of conservation and naming of plants'.[40] This may have represented a move to emphasize the scientific research taking place at Kew at a time when the first Commissioner of Works, Acton Smee Ayrton, was mounting a campaign to transfer Kew's botanical collections to the British Museum's new Department of Natural History.[41] If successful, Ayrton's plan would have designated Kew solely as a public recreation facility and thus aligned it more closely with the likes of the populist Adelaide Gallery and Royal Polytechnic. The *Mechanics' Magazine* had criticised the scientific spectacles offered by such institutions for the way they attracted 'curious idlers' (Morus 2007, 340), and by not offering popular lectures, Kew may be understood to have been creating distance between the worlds of science and spectacle. Furthermore, the arguments put forward to the Commission by Joseph Hooker and George Bentham offered a justification for two botanical museums in London based on a division of duties: the Department of Natural History at South Kensington should be designed with a popular audience in mind, its displays arranged to show 'the relations of plants to one another...and the general features of the Vegetable Kingdom'.[42] It

[40] 1872 [C.536] *Op. cit.,* p.436

[41] For more detail on the 'Ayrton Controversy' see Chapter Eight

[42] 1872 [C.536] *Op. cit.*, p. 436

would be better placed to conduct a popular 'scheme of instruction' because of its more central location.[43] Whatever Hooker's motivation in resisting public lectures, the Committee came to the same conclusion, declaring that 'lecturing and curatorial work are entirely different occupations, aptitude for the one by no means implying skill in the other' and that there were in fact other ways of instructing the general public, in particular by 'the skilful arrangement of the specimens exhibited to the public' and by 'providing Descriptive Labels'.[44] For the time being at least, it was the displays themselves which would provide the principal means of popular instruction at the Museum of Economic Botany.

Perhaps the resistance of Joseph Hooker and Thiselton-Dyer also testifies to the decline, during the latter part of the century, in the popularity and 'assumed efficacy' of the set-piece public lecture (Forgan 1994, 153) and its gradual replacement by the guide-lecturer. In 1911 'short lectures and explanations' alongside the displays were introduced at the British Museum (BM), and in 1912 at the BM's natural history department in South Kensington, thus shifting the locus of instruction from the lecture theatre to the museum gallery. The popular response to these tours was decisive: in only three years over 50,000 visitors participated, sufficient to persuade the Victoria and Albert Museum to adopt a similar system in 1913. As the Liberal Lord Sudeley argued, labels on their own were no substitute for the interpretative skills of a human guide, as was proven by the 'eager and enraptured attention' of those who attended (Sudeley 1913, 1214); and a BM guide, Cecil Hallett, observed that 'nothing can bring the general public and a museum into a right relation with each other so well as the living voice of a human expositor' (cited in Alberti 2007, 382). 1913 was also the year in which 'guide demonstrators' were introduced at Kew. Tours were charged at 1/- for an outdoor tour of the

[43] 1872 [C.536] *Op. cit*, p.469

[44] 1874 [C.884] *Fourth Report of the Royal Commission on Scientific Instruction and the Advancement of Science,* p.19.

Gardens and 2/6 for an indoor tour which included the Glasshouses and Museums. There were a disappointing 181 participants that year,[45] the lack of public response attributed to the 'prohibitive' charge and to poor publicity (Sudeley 1913, 1216). In 1960, after an indeterminate interval, the idea was reintroduced to the Museums with the appointment of Rosemary Angel as a 'guide lecturer' (Desmond 2007, 354) and this arrangement lasted until the closure of the remaining two Museums in 1987.[46]

4. Conclusion: objects and the imparting of knowledge

Like the Gloucester Road School headmaster C. E. Chase, Thiselton-Dyer was convinced of the value of the 'products of the Empire' in teaching botany and geography. By supplying schools with specimens identified, preserved, classified, and labelled according to Kew conventions, he was expanding the function of the Kew Museum as a disciplinary agency of economic botany, and extending the Kew 'way of knowing' beyond the Museum's glass cases. In line with his predecessors William and Joseph Hooker, he saw the role of the Museum displays as one of providing 'scientific information', and that 'scientific training', as outlined in the BAAS report on scientific education (BAAS 1867), should be provided to clearly-defined student groups. He was keenly aware that all students were more likely to retain the knowledge gained from seeing and handling objects and from conducting their own experiments, be they elementary school pupils, trainee teachers, graduates of forestry schools, or apprentice gardeners. It is this which united the various instructional opportunities offered by the Museum of Economic Botany, and ultimately it is for this reason that lectures to the general public were the one element of the

[45] TNA Ministry of Agriculture and Fisheries (MAF) 46/13 House of Lords Return on Museum Attendance 1913

[46] Currently a small number of guided tours of the former Museum No. 1 is given each year by the adult education team.

Lindley 'charter' that was not implemented at Kew itself. The resistance of various Kew directors to the idea lay in issues of governance, resources, and priorities, but above all in notions of what constituted scientific instruction: physical access to plant specimens, under the guidance of texts based on the Kew Museum collections, and in consultation with museum officers. It was this assemblage, with the provision of research methods to enable the discovery of new truths, which was considered vital to the 'the exercise of [the] lively intelligence' which constituted the Kew 'temper' and to the construction of economic botany as a scientific discipline.

Figures 5.1 and 5.2 Empire Day Exhibition, Gloucester Road School, Camberwell, London 1914

Canada (above) and West Indies (below)

Figure 5.3 Object lesson on flower structure, Goodrich Road School, East Dulwich, London 1907

Image courtesy of the London Metropolitan Archives

A Course of Elementary Science Lessons for Lower Standards

Lesson IX. – Sugar

On this subject, Johnston's "Chemistry of Common Life" referred to in the last lesson, is again helpful.

Apparatus.- Blackboard, &c.; lump sugar, moist sugar, beetroot, picture of a sugar plantation.

MATTER	METHOD
a. Sweet Juices. – Nearly all substances which have a sweet taste, especially those got from plants, contain sugar. Some things of this king are:- Fruits, such as grapes and currants, apples, pears, and strawberries; honey, rice, milk; the sugar-cane, the maple tree, beetroot. The juice is taken from some of these, and the sugar separated. The *sugar-cane* is grown in warm parts of America. In North America sugar is made from the sap of the maple tree. A kind of beet, called *sugar-beet*, is cultivated in Europe. This is a plant with a large, thickened root, like the carrot. The root is very juicy, and it is this juice which is made use of for sugar.	It will be to the teacher of the youngest children that this subject will present the greatest difficulties. It will be necessary for him to arrange his matter so that a clear and distinct outline is given, but without touching more than is absolutely necessary upon topics for which the minds of the children are not prepared. The list of substances containing sugar may easily be drawn from the children. In the case of the fruits, only a few of the most striking examples need be taken. Out of the sugar-yielding substances, only the three most important have been chosen for special reference, in order to give the lesson greater simplicity. Names of places given in these lessons are more likely to be forgotten, unless they are associated with some interesting facts. The locality of the sugar-maple may be impressed by connecting it with a brief description of the juice-collecting, or the use of the "maple honey" amongst the Canadians. A beetroot should be shown. Recapitulate this division.
b. The sugar-cane is more used than anything else from which sugar can be taken, as the juice is the sweetest, and has the most pleasant taste. It is a kind of grass, and grows to a height of about 15 or 16 feet. Long, narrow, serrate leaves grow out from the knotty rings. The cane itself is of a bright yellow colour, marked with red. It is about two inches thick, and solid. When the canes are ready, they are cut close to the ground with a knife. The tops are taken off, because the juice of this part is not sweet enough for use in sugar-making. The canes are cut into length, tied in bundles, and carried to a mill. Here the juice is crushed out between heavy rollers, then boiled, and, when it cools in large open vessels, little crystals of sugar are found in it. Casks are then filled with this thick liquid. The crystals remain in the casks, and *the treacle* runs away through	Show a picture of the sugar-cane, or, better, draw a diagram on the blackboard; also, produce the cane, and compare it with wheat, referring to the difference between the interiors of the stems. Describe the appearance of a sugar plantation, with parties of negroes employed in cutting down the canes. The word "crystal" may be introduced, but the elucidation can only consist in showing crystals, including those of sugar, and, perhaps, a diagram or two on the blackboard. Anything further would have no basis on which to rest in the children's minds, and would, therefore, be lost. No mention is made of lime added to the juice which comes from the rollers, as the chemical principles involved could not possibly be grasped by children, who have not studied that

(continued overleaf)

holes in the bottom. The sugar is of the kind called *raw or moist sugar*, and is sent away in this state.	science, and the omission will in no wise injure the clearness of the outline. Review.
c. Sugar-refining. – Our sugar undergoes a process in this country called refining. The little sugar crystals are dissolved in warm water, and means taken to clear everything away excepting the pure sugar. This is done chiefly by filtering – first, through cloth, and afterwards through charcoal, till the liquid is colourless. Then it is boiled until it becomes thick, and can be run into moulds. Part of the liquid will harden as it cools; the other part will not, so it is run off, and sold as *golden syrup*. The hard lump turned out of the mould is a sugar-loaf, and is cut up by the grocer for sale as *lump sugar*.	In a case like this, where the primary reasons for the processes cannot well be understood by the class, great care should be taken that the successive stages are clearly shown in the "blackboard heads". For example, the three words "cleared", "boiled", "hardened", would embody all the ideas given in this division, as well as help in impressing the order of the different operations. Compare the moist and lump sugar, and lead the children to see the necessity for refining Make clear the distinction between treacle and golden syrup. Revise the whole lesson.

Figure 5.4 Lesson plan for sugar

Source: *The Teachers' Aid* 1886a

CASE 93. TRIBE VI. *Andropogoneæ*. Various samples of Sugar, raw and refined, are here exhibited; they are the produce of the SUGAR CANE (*Saccharum officinarum*, L.), a woody stemmed grass growing from 8 to 12 feet high, occurring both wild and cultivated throughout Tropical and Sub-tropical Asia. The cultivation of the plant extended to Persia in the early Middle Ages, and was carried by the Arabs into Sicily, Cyprus, Spain, and Italy. It quickly spread into other parts of the world, being introduced to San Domingo in 1494, and into Brazil early in the 16th century. At the present time it is very largely grown in the West Indies, Mauritius, British Guiana, Natal, Queensland, Java, and many other countries. Near Malaga, in Spain, is the only place in Europe where its cultivation is still carried on.

To obtain sugar the stems are cut down, stripped of their leaves, and passed between heavy iron rollers; the juice thus obtained is boiled, clarified, and evaporated, and when it has acquired a proper tenacity and granulation, it is emptied into a cooler to crystallise; after which the concrete sugar is placed in casks and allowed to drain, when it is transferred to hogsheads, and is ready for exportation under the name of raw or muscovado sugar. The uncrystallisable portion which runs from the raw sugar is known as molasses.

To prepare sugar for table and other uses it is either treated by "centrifugals" and washed to obtain white crystallized sugar or subjected to a process known as refining, in the course of which it is concentrated, and the syrup poured into conical moulds; when this has solidified the loaves, as they are called, are placed in pots so that the drainings, which constitute treacle, may run from them, and when thoroughly drained, the sugar is known in commerce as loaf sugar.

Note in this Case drawings of different varieties of sugar cane cultivated in Mauritius, also photograph of flower-head of sugar cane, called the "Arrow," and of a cane field in Jamaica during the process of cutting, and samples of molasses, and rum, a well-known spirit distilled from molasses or cane juice.

[On the wall under the circular window, between Cases 98 and 99, observe an oil painting illustrating the manufacture of sugar at Katipo, near Teté, in Eastern Tropical Africa. It represents the cutting of the cane into lengths, crushing it in the mill, and the subsequent boiling and crystallisation of the juice. A painting of the Sugar Cane is shown on the wall under the circular window between Cases 103 and 104.]

Figure 5.5 Sugar cane entry in the Kew Museums *Official Guide*

Source: RBGK 1895 ©RBG, Kew

Figure 5.6 EBC40591 Sample of crude sugar from Livingstone's expedition to East Africa.

Figure 5.7 Thomas Baines *Manufacture of Sugar at Katipo* (1859; oil on canvas)

Figure 5.8 School museum cabinets, Goodrich Road School 1907

The museum cabinets can be seen behind the screens

Courtesy of the London Metropolitan Archives

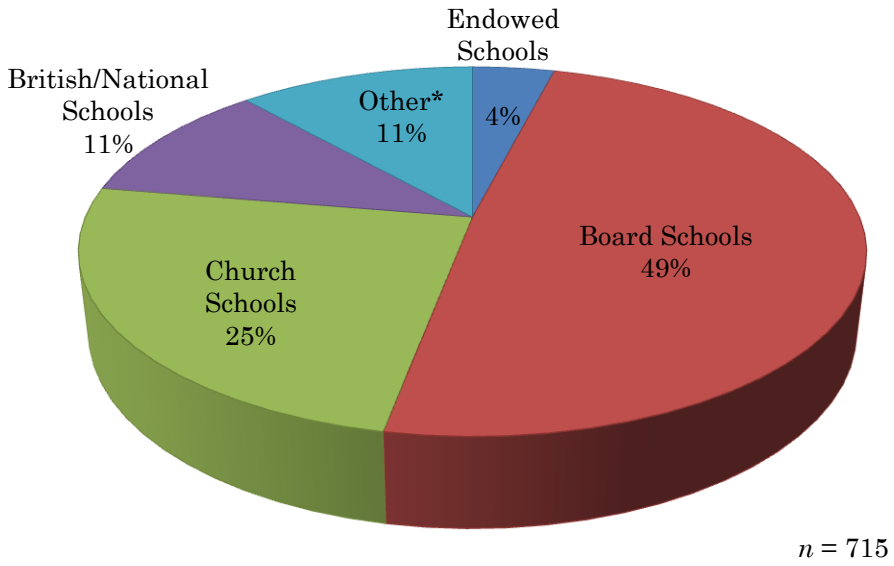


Figure 5.9 Applications to Kew Museum for school museum specimens 1877-1914 *by type of school*

*Includes technical, charity, trade, handicraft, independent, grammar, and special schools

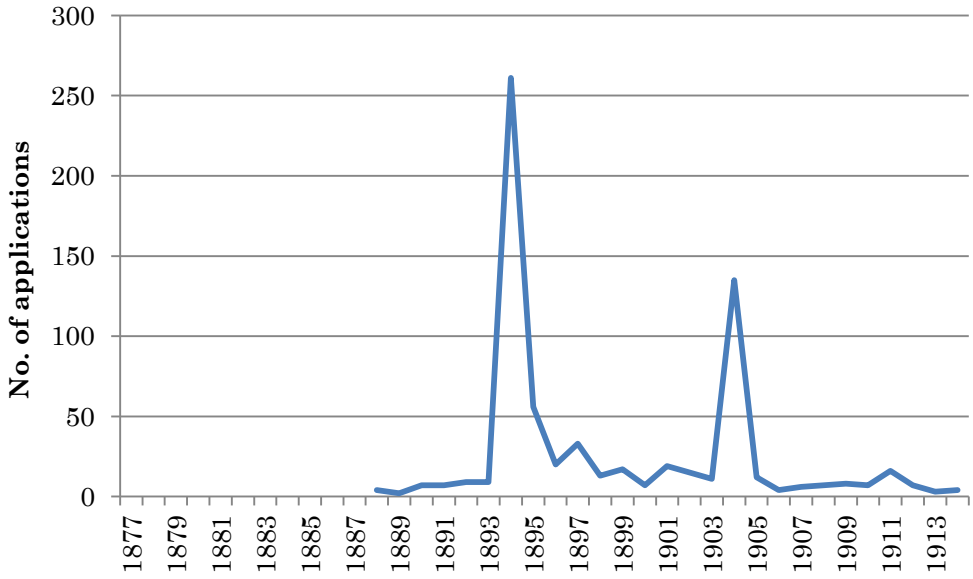


Figure 5.10 Applications to Kew Museum for school museum specimens 1877-1914

Source Figures 5.9-5.10: RBGK, EBC School Museums Letters Vols. I-III

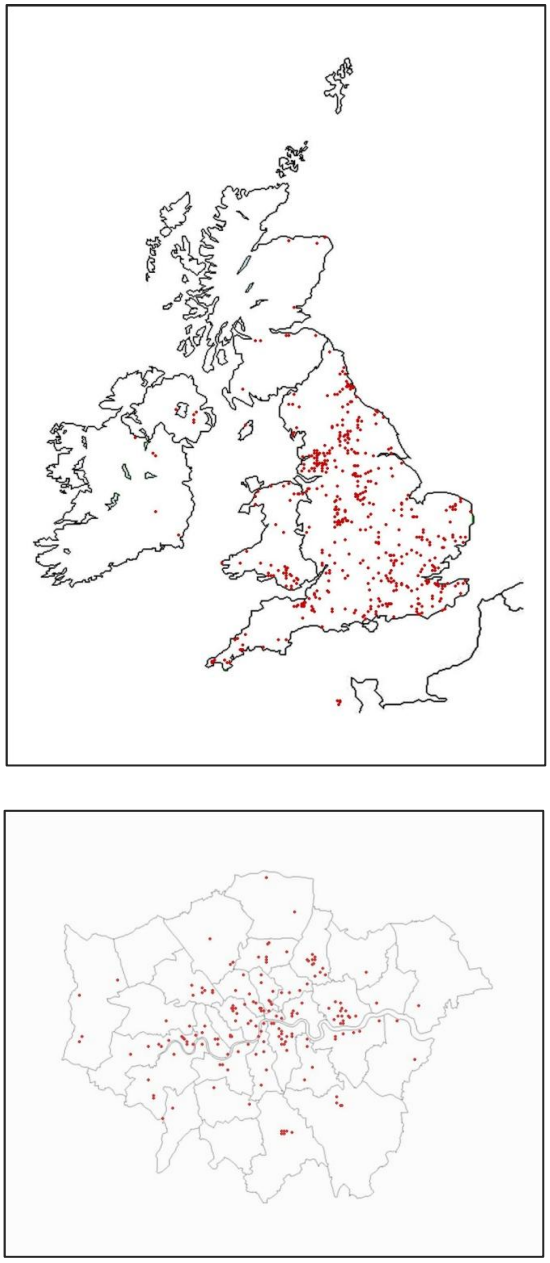


Figure 5.11 Geographical profile of schools receiving specimens from Kew Museum 1877-1914

Above: United Kingdom recipients excluding London;[1] below: London recipients[2]

Source: RBGK, EBC School Museums Letters Vols. I-III

[1] Map shows present border of United Kingdom between Northern Ireland and the Republic of Ireland.

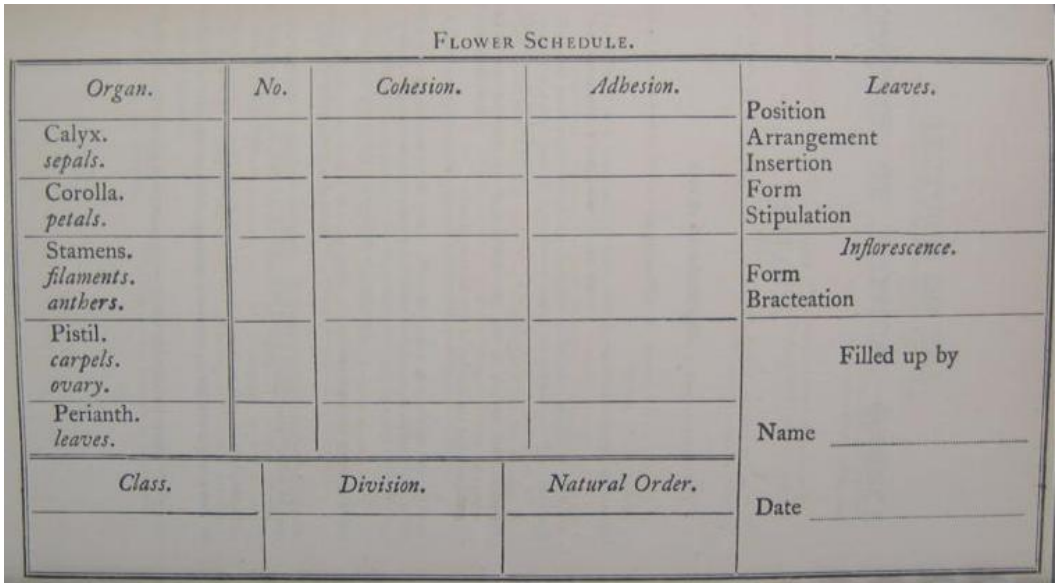
[2] Map shows boundaries of current London boroughs, not of former school boards.

Figure 5.12 Kew apprentice gardeners attend a lecture on economic botany in Museum No. 2 (n.d.)

The lecturer's name is not given but he closely resembles museum curator John Reader Jackson

Figure 5.13 Lyon Playfair lectures at the Museum of Practical Geology

Source: *Illustrated London News* 21 February 1852



FLOWER SCHEDULE.

Organ.	*No.*	*Cohesion.*	*Adhesion.*
Calyx. *sepals.*			
Corolla. *petals.*			
Stamens. *filaments.* *anthers.*			
Pistil. *carpels.* *ovary.*			
Perianth. *leaves.*			

Class.	*Division.*	*Natural Order.*

Leaves.
Position
Arrangement
Insertion
Form
Stipulation

Inflorescence.
Form
Bracteation

Filled up by

Name _____

Date _____

Figure 5.14 Daniel Oliver's 'Flower Schedule'

Source: Oliver 1870; ©RBG, Kew

CHAPTER SIX

‘Supply’

The Schlagintweit woods

On 20 September 1854 brothers Hermann, Adolph, and Robert Schlagintweit set off on a three-year expedition to India and High Asia which was sponsored jointly by the East India Company and the King of Prussia. From 1854-57, each taking different routes, the Schlagintweits covered 18,000 miles, mostly on foot. They recorded magnetic and meteorological conditions, made maps, sketches and paintings, and collected all manner of material including ethnographic artefacts, manuscripts and prints, and 14,777 natural history specimens, amongst which were 650 tree sections. In their endeavours they were assisted by South Asians of varying castes whose services they remunerated and whose knowledge they relied on. The expedition was cut short by the Sepoy Uprising of May 1857, and Robert and Hermann returned to Europe immediately. Adolph opted to travel back overground via Turkestan where he met an unfortunate end. In Berlin Robert and Hermann sorted the collections; a set of duplicates was retained there and the remainder went to the East India Company Museum in Leadenhall Street (Finkelstein 2000). Some twenty years later, on the closure of the India Museum (Figure 6.1) in 1879, its entire collections were dispersed. All of the botanical material –

including the Schlagintweit woods – was transferred to the Kew Museum. The processes of 'intercalation' – filling in the gaps in Kew's own collections – and 'distribution' – transfer to other institutions – occupied museum staff for the greater part of a year. The wood collection in general had not been well curated since the demolition of East India House in 1863, after which the Museum had entered a peripatetic phase, moving between multiple sites of display and storage before eventual dispersal. Most specimens – including the Schlagintweit tree sections – came 'without names, history, or information regarding them of any kind' (Hooker 1880, 59). With no provenance they were of little value to Kew, and 557 specimens, 'expensively mounted on brass tripod stands, forming the Schlagintweit Collection, but much deteriorated and useless to Kew on account of the loss of labels and catalogue, were eventually sent through the India Store Department to the Forest School at Dehra Doon' (Hooker 1880, 59).

The Schlagintweit woods had completed a virtual circuit from colony to metropole and back. There were 'push' and 'pull' factors at work here: the fortunes of the India Museum were contingent on those of the East India Company, which had lost its administrative powers in 1858. As a result, the Museum's collections were transferred to the ownership of the India Office and endured physical and documentary losses through the subsequent series of moves. Without the means to identify the woods or the resources to restore them to their former condition and with no permanent museum storage facility of its own, Kew had only the options of destroying or transferring the Schlagintweit specimens. Joseph Hooker knew the fiscal and human costs of obtaining these woods – he had served on the committee that had advised on all aspects of the expedition, including its funding – and was averse to the option of destruction.[1] In this case too, the knowledge by which the woods

[1] Letter from Thiselton-Dyer to Louis Mallett at the India Office, 20 February 1880: 'They undoubtedly represent the expenditure of a very considerable sum of money, and although

might become of scientific use lay back at their source – in British India – where a combination of local knowledge of tree species and their properties, and imported European knowledge of 'scientific' forestry techniques, might be deployed to release the knowledge contained in the woods. The Schlagintweit woods were of potential use for the purposes of training future foresters there and for constructing imperial identities (MacKenzie 2009, 246).

A decade on, the poor condition of the woods was further alluded to in an 1891 letter from James Sykes Gamble – Director of the Forestry School at Dehra Dun – to Kew Director William Thiselton-Dyer:[2]

> I am having that Schlagintweit collection looked at and cleaned and shall cut small sections out and burn the rest; it is rather a white elephant here as I think it probably was to you.[3]

The woods had not proved to be the 'useful acquisition to a forest museum' that Thiselton-Dyer had suggested to Brandis at the time of the transfer in 1880.[4] From Gamble's comment it is not even clear whether the woods had been eventually identified at the Forestry School, but in either event, their poor condition precluded their use as display objects. Kew had readily accepted the role of sorting and distributing the India Museum botanical collections, since prior to this it had no official access to the network of acquisition which extended across the EIC from London to Calcutta. It had used the exercise,

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under present circumstances they are perfectly useless, Sir Joseph Hooker is not disposed to undertake the responsibility of ordering their destruction without specific instructions to that effect'; RBGK Archives, India Museum 1875-92 Volume I, ff.148-151

[2] Thiselton-Dyer had been involved in the India Museum dispersal as Assistant Director, as demonstrated by a letter to him from Birdwood dated 13 July 1879; RBGK Archives, India Museum 1875-92 Volume I, f.21

[3] Letter to Thiselton-Dyer, 3 May 1891; RBGK Archives, DC Volume 154 (North West India), f.256

[4] Letter from Thistleton-Dyer to Dietrich Brandis at Dehra Dun, 25 September 1880; RBGK Archives, India Museum 1875-92 Volume I, ff.162-164

firstly to fill gaps in its own collection, and secondly to supply an extended museum community.

A number of themes arise in this short narrative: the difficulties experienced by the Kew Museum in acquiring Indian specimens prior to the Government of India Act (1858); and equally, the new opportunities presented to Kew with the transfer of the India Museum to the India Office. It points to Kew's efforts to form alternative networks of exchange with other agencies of Indian economic botany – here the Indian Forest Department – as a means of growing its Indian collections, and it highlights the fact that the collecting of Indian plant products was an active pursuit common to institutions in both metropole and colony. Indeed, this fact goes some way to explain the circuitous journeys undertaken by objects such as the Schlagintweit woods. But on another level, the incident is illustrative of the Kew Museum's role as supplier to the broader museum community, a role which Kew officers worked consistently to build and defend.

This chapter will consider the third term in Lindley's 1838 report – 'supply'.[5] In that context the term described the provision of plants to colonial botanic gardens in projects of transplantation, and the redistribution of 'new and valuable plants' received from abroad to public gardens in Britain.[6] In the context of this chapter, as explained in Section 1, I extend the usage of the term 'supply' to refer to the re-distribution of specimens (and other forms of knowledge) from the Kew Museum to other collecting institutions in both metropole and colony. Through a focus on the Indian woods which passed through the Museum, the perambulations of specific sets of objects, etched in

[5] TNA PRO WORK 6/297 *Report of Committee on Expenditure and Management of the Royal Gardens. Vol.1.*

[6] 1840 (292) *Botanical Garden (Kew). Copy of the Report made to the Committee appointed by the Lords of the Treasury in January 1838 to inquire into the Management, &c. of the Royal Gardens at Kew,* pp.4-5

textual and pictorial documents and in the objects themselves, are revealed. The argument is that the Kew Museum was involved, therefore, not in a one-way process of supply, but in that of circulation, for it was through the medium of exchange that the collections were built, knowledge was produced, and the discipline of economic botany was established. To this end the first section considers a series of models of circulation – centre of calculation, information exchange, entrepôt, and clearing house – in order to account for Kew's particular mode of operation. The second section examines what Saloni Mathur has called the 'cosmopolitan circuits of exhibition and display' (Mathur 2007, 9) – the 'market' for the collection and display of Indian natural history specimens and artefacts in London and abroad. Here I highlight the competition for objects and for visitors, and the complex network of circulation this created. The case history of the 1879 dispersal of the India Museum collections serves to illustrate how objects come to take such circuitous journeys, but also to highlight those networks of collection which had previously been inaccessible to the Kew Museum. By contrast Section 3 provides a case study of woods exhibited in Paris in 1878 in order to demonstrate how Kew pre-emptively established networks of supply in order to grow its own collections. And Section 4 illustrates an attempt by the Kew Museum to establish alternative networks of exchange with Indian institutions, here with the Imperial Forestry Institute. En route the word 'supply' is revealed as problematic insofar as it implies a unilateral process which was far from the case.

What emerges, through an investigation beginning with wood specimens at the Kew Museum, is not a story of Kew in and of itself; rather, the chapter reveals a dispersed view of the forms in which knowledge of India – objects, texts, images, people – circulated within India, between India and other colonies and sovereign states, between India and the metropole, and within the metropole itself. This approach inevitably calls into play the role of South Asians in the

production and circulation of scientific knowledge of the subcontinent, reinscribing indigenous agency into the narrative of circulating India.

1. Terms of supply

> T. H. Huxley: What do you do with duplicates, if you have any?
>
> J. D. Hooker: I generally keep a list of the establishments to which each class of duplicates will be most useful, and distribute them very much accordingly. Sometimes there are as many as twenty-five or thirty sets of duplicates in one collection, and, so far as the specimens are concerned, we distribute them ticketed with a name or number corresponding with the name or number they bear in the Kew collection, so that each specimen is the authority for Kew.[7]

In response to Lindley's recommendation regarding 'supply', William Hooker promptly re-vitalised the Kew practice of supplying live plants, cuttings, and seeds from his appointment as Director in 1841, as befitted the status of the 'National Botanical Garden'.[8] The volume of 'goods outwards' from the Gardens increased dramatically from 1842 onwards, and the type of recipient changed too, from the crown-heads of Europe and aristocratic estates in Britain, to a greater emphasis on colonial botanic gardens, and British nurserymen and public gardens.[9]

Following the opening of the first Museum in 1847, a similar distributive role was introduced for museum objects. In 1862, for example, as a result of the large accessions to Kew on the closure of the London International Exhibition, the distribution of duplicate named specimens was described as 'very large, amounting to upwards of 30,000, sent to public and private Herbaria and

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[7] 1872 [C. 536] *Royal Commission on Scientific Instruction and the Advancement of Science Vol. I First, Supplementary, and Second Reports, with Minutes of Evidence and Appendices*, p.437, ¶6728

[8] 1840 (292) *Op. cit.*

[9] RBGK Archives, Goods Outward Registers 1805-1836; 1836-1847.

Museums' (Oliver 1863, 5). Thereafter, the quantity of duplicates redistributed to other collections became a regular feature of Kew officers' workloads and of Kew's annual reports.

The role of the Kew Museum as a distribution centre for botanical specimens came under the scrutiny of the Devonshire Commission in 1872, against the background of the proposed construction of the British Museum's (BM) natural history department at South Kensington. Joseph Hooker's comments above are indicative of the extent to which Kew had by this stage assumed the role of clearing house for botanical museum specimens, and the scientific authority which accrued to Kew by doing so. All re-distributed objects were 'ticketed with a name or number corresponding with the name or number they bear in the Kew collection so that each specimen is the authority for Kew'.[10] This of course facilitated future research into the specimens, but it was in effect an act, on Kew's part, of 'authoring' specimens (Alberti 2011, 62), transferring its own naming and numbering systems to recipients, and thus achieving greater scientific 'authority'. When asked about the relationship between Kew and the BM, Hooker replied that they were 'competing bodies' but that 'hitherto the chief Government collections have been sent to Kew'.[11] For a while it looked as though this might change, but the Committee was clearly satisfied with Hooker's account, and concluded that 'all collections of recent plants made by Government Expeditions should, in the first instance, be sent to Kew, to be there worked out and distributed, a set being reserved for the British Museum'.[12]

[10] 1872 [C. 536] *Op. cit.,* p.437, ¶6728

[11] 1872 [C. 536] *Op. cit.,* p.434, ¶6660

[12] 1874 [C. 884] *Fourth Report of the Royal Commission on Scientific Instruction and the Advancement of Science,* p.10

In 1880 the Kew Museum was entrusted with the dispersal of the entire economic-botanical collections of the India Museum (including the Schlagintweit woods), the single largest and most publicised act of redistribution it had undertaken thus far. The scale of the exercise prompted the introduction of new procedures. From 1881 a register of 'Distributed Specimens' was kept for all objects transferred from the Kew Museum to 'kindred institutions' (Hooker 1880, 50). These registers still reside with the Collection and are referred to regularly by the curatorial staff. They yield some interesting data: from 1881 to 1914 museum and university collections were a constant destination of duplicates from the Kew Museum, as were botanic gardens (Figure 6.2).[13] Amongst learned societies, the Pharmaceutical Society of Great Britain was the most frequent beneficiary, particularly for objects of *materia medica*.[14] Objects received from Kew were intended for the museums of these societies, or their teaching or research collections. The commercial sector, whilst a vital source of donations for the Kew Museum, was a rather less significant recipient. In reality such donors were more likely to be seeking other forms of knowledge, such as plant identifications, cultivation advice, and economic botany data. Traders' and manufacturers' involvement in economic botany consisted not in the amassing of collections for display, teaching, or research, but in the distribution of knowledge across commercial networks for profitable ends.

As regards the geographical distribution of the objects (Figure 6.3), the UK received the highest number over the period. British colonies and Europe

[13] Note: these data do not include transfers to schools which were considered in Chapter Five as part of Kew's education programme. They are also exclusive of any unspecified transfers i.e. where the nature of the recipient is not given.

[14] The Society became the Royal Pharmaceutical Society in 1988. From 1842 it had its own museum, primarily for teaching purposes. A particularly productive period of exchange occurred during the tenure of Edward Morrell Holmes as its curator from 1872-1922.

received objects in closely comparable quantities, but in the mid-1890s transfers to colonies tailed off as a result of the increasing sphere of influence of the Imperial Institute, particularly after the opening of its Scientific and Technical Department in 1896. Transfers to the USA were fairly consistent in the 1880s and '90s, reflecting the strength of museological and scientific associations with, in particular, Asa Gray at Harvard University, Charles Sprague Sargent at Harvard's Arnold Arboretum, and Spencer Fullerton Baird at the Smithsonian Institution in Washington.

A recurrent feature of the data is the relationship between the timing of international exhibitions and transfers. Kew's success in securing the residual botanical collections after such events becomes clear, with periodic flurries of transfer occurring in 1888, 1901, and 1911, following sizeable accessions into Kew from the Colonial and Indian Exhibition (1886), the Paris Exposition Universelle (1900), and the Japan-British Exhibition (1910) respectively. However, the danger of looking at these data in isolation is that they reinforce the notion of 'supply' as a unilateral movement from centre to satellites. It is only when looked at in conjunction with 'goods inwards' to Kew, that we can begin to understand these flows, not as the course of a river flowing to the sea, but as the global ebb and flow of tides – as circulation, rather than supply.

Models of circulation

As noted in Chapter Two, Bruno Latour's concept of 'centres of calculation' portrays the creation of field data in a mobile, stable, and combinable form to facilitate the production of knowledge in metropolitan centres. Such knowledge is produced by the gradual accretion of data from a series of expeditions or experiments – 'cycles of accumulation' (Latour 1987, 219-223) – enabling comparison to take place. It is a model which fits well with the activities of the Kew Herbarium under William Hooker and his successors;

since 1841, plants from around the world were collected according to criteria issued by Kew, dried, pressed, and ticketed, and once at Kew, mounted on paper sheets of identical specification. Only then, and only there, according to the Latourian model, could the practices of combination and comparison take place which enabled Kew to achieve pre-eminent authority in the realms of nomenclature and classification, a process of 'naming and claiming'. Whereas colonial botanists, observing plants from their 'partial' perspective, would perceive multiple species, from his metropolitan cabinet Joseph Hooker considered such proliferation as merely 'splitting' (Endersby 2008, 137-169). A plant preserved on a herbarium sheet in a particular way, complete with particular inscriptions, is what Latour terms an 'immutable mobile' (1987, 227): its meaning is fixed, enabling comparison with other sheets accumulated over a long period.

However, the Museum of Economic Botany appears to fit the Latourian model with some difficulty. Museum objects as diverse as botanical specimens, ethnographic artefacts, manufactures, and illustrated series, were undoubtedly combined in the museum cases to demonstrate the several stages of a single process – that of identifying useful plants and applying them to the needs of industry. Illustrations, photographs and maps also formed part of this method. But whilst the display as an aggregate might be termed an immutable mobile in that a complete display could, and indeed was, reproduced in other settings to a greater or lesser degree, none of these elements in isolation could be deemed to be so. Furthermore, whereas the taxonomic knowledge produced in the Kew Herbarium went to form compendium publications such as floras, there was no equivalent for the Museum.[15] Individual plant species and their uses were discussed in articles in the Kew *Bulletin* and via the learned societies. However collectively they did not form a coherent whole, beyond

[15] The Museum Guides are not equivalent because they did not catalogue the entire collection.

their shared relation to systematic botany. In examining the circulation of objects through the Museum, then, we need to consider alternative models.

In his assessment of the functions of the Royal Geographical Society during the long nineteenth century, Felix Driver highlights the Society's multiple objectives: the development of standardised procedures for geographical fieldwork; the establishment of a centralised archive of geographical knowledge; and the diffusion of that knowledge to instructive ends (Driver 2001, 29). Since this involved the co-ordination of knowledge in multiple forms, the RGS, he argues, is better described as 'an information exchange' than as a 'centre of calculation' (2001, 36-37). The Kew Museum also strove to establish normative standards for economic botany. It shared, too, the RGS's aim of acting as a centralised archive; the density and heterogeneity of its displays illustrate the point. These, in conjunction with the museum library of published texts and the museum officers themselves, represented an archive of knowledge on useful plants which could be consulted by interested parties. Like the RGS, Kew circulated information to a worldwide audience via its own media, such as the *Bulletin of Miscellaneous Information,* but it relied too on other platforms to broadcast its message, including the learned societies which, by their very nature, harboured a range of perspectives. There are aspects, then, in which the Kew Museum can be seen as an information exchange – a model which appears particularly well-suited to the role of the learned society – but in other regards, as a participant in a competitive exhibitionary and disciplinary landscape, and as an agency of government, it was more concerned with communicating a particular view of economic botany than with representing the diversity of the field.

It is by comparing Kew with other museums that a more precise definition of its mode of accumulating knowledge can be reached. The BM, in its capacity as distributor of the zoological specimens collected on Livingstone's Zambezi

Expedition (1857-64), has been described by Lawrence Dritsas as 'an entrepôt for natural history'. In contrast to a centre of calculation – the 'end of the line where all the further analytical work was performed' – the BM received all the specimens and evaluated them, before passing on certain material to centres of greater expertise. The Museum retained scientific authority by being awarded this task of 'taxonomic triage', and by 'propelling' the specimens 'further along their epistemic journeys' (Dritsas 2010, 139). With its mercantile associations, the 'entrepôt' model seems at first glance an appropriate one for the Kew Museum, were it not for the fact that it implies a site designed solely for the transit of objects. Kew did not undertake the role of re-distribution primarily for commercial or altruistic reasons, but to build the most comprehensive economic botany collection in the metropolis. The objects it distributed were a consequence of this objective. Kew directors fought tirelessly to achieve for their institution the status of 'obligatory passage point' (Latour 1987, 150), and as Drayton reminds us, after 1854 all botanical collections made at government expense went first to Kew (Drayton 2000, 201).

With this in mind, I propose the model of 'clearing-house' to describe the nature of the Kew Museum's activities in supplying the circuits of display. A distinctly nineteenth-century coinage, it has fiscal origins which are particularly appropriate to a museum of economic botany. Just as the original London clearing house was introduced by bankers to settle mutual claims for the payment of cheques and bills, so Kew frequently figured as the designated locus for collecting institutions to settle their own claims to objects deposited at Kew, as the India Museum example illustrates.

2. 'Cosmopolitan circuits of exhibition and display'

In order to place Kew and its Indian collections in context, this section provides a survey of Indian collections in a range of sites across metropole, colony, and beyond. The enterprise of collecting and displaying Indian natural history and material culture during the long nineteenth century was extensive and competitive, with institutions vying for both objects and visitors, in an age when the visitor statistics of national museums were gathered and published.[16] The result, as demonstrated by the case history of the India Museum dispersal, is an explanation of how objects came to take such circuitous journeys around institutions of collection and exhibition.

Kew's Timber Museum – Museum No. 3 – did not initially feature India in its geographically-ordered displays (Figure 6.4). This absence may be attributed to the role of the India Museum as a destination for botanical materials until the dispersal of its collections in 1879 (Desmond 1982). In looking at the Kew Museum's collection of Indian timbers during the first twenty years of the Museum's existence, one is struck by its sparsity (Figure 6.5). One of the earliest accessions of significant size came from Joseph Hooker's trip to the Himalayas (1848-51), which he catalogued on his return; there were 643 specimens. Accessions from the East India Company (EIC) were recorded on only two occasions, in 1849, and again in 1852 after the Great Exhibition. There appear to have been advantages to both parties on this occasion: Desmond relates that the India Museum could not accommodate the number of objects accruing from the Exhibition (Desmond 1982, 74) and actively sought to transfer material to other institutions.

[16] For example: 1857 Session 1 (152) *National Collections. Return showing how far, in the different National Collections of works of art, objects of historical interest, or of science, the rule has been observed of attaching to the objects of art a brief account thereof; &c.*

Unofficial links between Kew and the EIC originated in William Hooker's time as Regius Professor of Botany at Glasgow University (1820-41). Hooker was able to occasionally penetrate the EIC network because of the allegiance 'owed' him by former students who had taken up positions with the EIC (Grove 1995, 426), as claimed by Roderick Murchison in his somewhat hagiographic obituary to Hooker in the *Journal of the Royal Geographical Society*:

> …thus zealous botanists of his own training were spread almost broadcast over the face of the globe…indefatigable as a letter writer, and strictly punctual in reply, he attended to all those who applied to him for information and thus knew everything which was done in his favourite science all over the world (cited in Grove 1995, 426).

Furthermore, in 1858 Joseph Hooker gained permission to examine the herbaria of Hugh Falconer and William Griffith in the cellars of East India House. He offered to take away eleven wagon loads of plant specimens and illustrations for identification and cataloguing, and the EIC granted him £200 for the task which was to last six years. Joseph was entrusted with the responsibility of retaining for the Kew Herbarium those species not already represented in its collection, and dispersing any duplicates to other institutions in Europe, North America, and India (Desmond 1982). This episode acted as a precursor to the dispersal of the Indian Museum's botanical collections after its closure in 1879.

It may have been 1858 when Joseph Hooker first became aware of the extensive collections of woods which 'had been lying for years at the India Office Stores in the Belvedere Road, Lambeth' (Hooker 1880, 59) but in any event, Kew's initial requests to have them transferred were unsuccessful. The development of Kew's networks with Indian botanic gardens after 1858 did, however, serve to enhance its Indian wood collections; from 1861 there was regular correspondence with Dr. Thomas Anderson, Superintendent of the

Royal Botanic Gardens, Calcutta, and this proved a fruitful association when, in 1868, Kew received a donation of 223 wood specimens from trees 'blown down in the Cyclone of 1864' (Figure 6.6). This is not to suggest that Kew had a monopoly of supply on this or other occasions; Anderson also despatched similar sets of wood to the Museum at the Imperial Garden, St Petersburg, the Jardin des Plantes in Paris, Edinburgh University, and the Forest Schools at Nancy and Hanover.[17] But it does illustrate that with the demise of the EIC, Kew was able to establish new relationships with Indian botanic gardens along lines of mutual interest.

Metropole

Kew was not alone in its efforts to build collections of Indian products and manufactures, as Bernard Cohn relates:

> For many Europeans India was a vast museum, its countryside filled with ruins, its people representing past ages – biblical, classical, and feudal; it was a source of collectibles and curiosities to fill European museums, botanical gardens, zoos, and country houses (Cohn 1996, 9).

From 1851 onwards, India was an unmissable presence at international exhibitions, which in turn furnished and embellished the collections of museums worldwide. In British exhibitions and museums, India came to be represented in two divergent ways: firstly, Indian arts and crafts were exposited as examples of best practice in design and manufacture. This might reflect a utilitarian approach according to which Indian designs were essentially a resource to be appropriated by British industry; or a more utopian view of the Indian village as the ideal unit of production (Driver & Ashmore 2010, 15). Secondly, India was portrayed as a seemingly inexhaustible source of raw materials – especially timber – and this was inferred in the plenitude of

[17] BL IOR V/27/560/61

the Kew Museum displays from 1878 onwards. Indian labour, too, could be represented as a raw material, as illustrated by the indigo factory model discussed in Chapter Four.

The India Museum had incorporated the notion of a 'cabinet of natural productions' since its inception in 1801, and indeed Charles Wilkins's 1799 plan for the Museum specified:

> The Vegetable Productions should, generally speaking, comprise specimens of all the plants, seeds, and fruits of Asia; but attention should, in a more particular manner, be paid to such trees and plants whose produce is an article of commerce. There should be specimens of all the different trees whose wood or timber is in estimation for ship-building, or domestic purposes; as well as such as are esteemed for their medical virtues or fragrant scent (cited in Desmond 1982, 8-9).

The India Museum was supported by the EIC's infrastructures of communication, collection, and transportation. Requests for objects could be made through the system of despatches to the presidencies and states under British control, and acquired by Company servants in the course of their official perambulations, seized in conflicts, forwarded from the Company's botanic gardens, or donated from the private collections of innumerable amateur naturalists. The Company's fleet of ships could transport objects between London and India. Plant specimens formed a significant proportion of this traffic from the earliest days of the India Museum (Desmond 1982) – not surprising considering the high number of surgeons on the Company's staff. By the nineteenth century, the Company's funding of collecting trips and botanical gardens had produced many of the leading figures in Indian botany and economic botany of the age, including Nathaniel Wallich, John Forbes Royle, and William Griffith. After 1858, when the India Museum became the responsibility of the India Office, the system adapted to its new circumstances, as George Birdwood, then Reporter on the Products of India and curator of the

India Museum's economic botany collections, explained in a letter to Joseph Hooker in 1879:

> The collections grow in this way – The India Office sends home certain grains/woods in for report. The specimens sent me are always kept in the Museum – collections are sent to the exhibitions – and any that survive the ordeal are sent to the Museum.[18]

Apart from the India Museum, botanical specimens from the subcontinent found their way into various other metropolitan collections. 'Natural and Artificial Productions' formed one of three headings under which the BM collections were organised (Thackray & Press 2001, 23). When the trustees agreed the formation of a separate Department of Botany in 1827, newly-appointed keeper Robert Brown transferred to Montagu House the vast 'herbarium' that Joseph Banks had entrusted to him, and began arranging it 'for the use of students' (Gunther 1980, 102).[19] During Brown's thirty-year tenure, the collections grew steadily – precisely during the period up to 1840 when no collecting was taking place at Kew. After that time the collections continued to grow, partly because valuable donor networks had been established by Brown, and partly because the BM was in a position to purchase desired objects (BM [NH] 1931, 42-56). Growth was 'constant' from 1827 to 1931 (1931, 56), boosted, from 1881 onwards, by the spatial opportunities afforded by the BM's new natural history department in South Kensington (Figure 6.7). As William Stearn relates, in the years from 1880 to 1900 the BM Department of Botany responded to Kew's increasing hold on imperial networks by focussing on its European and North American collections (Stearn

[18] Letter from George Birdwood May 26 1879 to Joseph Hooker; RBGK Archives, India Museum 1875-92, f.3

[19] Banks's 'herbarium' actually included many specimens, woods, models, manuscripts, drawings, engravings, copper plates, and so on (Gunther 1980, 102).

1981, 296). Throughout the history of botany at the BM and NHM, the emphasis has been scientific, specifically taxonomic in the nineteenth century:

> Though no attempt is made to initiate investigations in economic problems, the purely taxonomic side of these is frequently taken over, although taxonomic influence on a group is not influenced in any way by the fact that there are some economic problems attached to it (BM [NH] 1931, 55).

As far as the BM was concerned, economic botany was Kew's domain.[20]

India was also represented in other London museums. From its opening in 1857 as 'an omnibus museum of art and industry' (Robertson 2004, 1), the South Kensington Museum collected a broad range of objects, amongst which products of British India figured prominently. From natural history specimens to art manufactures, India was represented in its galleries alongside the panoply of arts and sciences on display there. Even after the advent of the Bethnal Green Museum and the Science Museum in 1872,[21] which left the original building as a museum of the decorative arts (Robertson 2004, 4-6), the respective museums continued to collect, display and circulate Indian material in categories which were all of interest to the Museum at Kew. It is interesting, therefore, to see how Joseph Hooker rationalised their respective interests in 1872:

> Hitherto there has been no competition between [the Kew and South Kensington Museums]...; for the Museum at South Kensington contains chiefly manufactured articles arranged according to their uses.[22]

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[20] The Devonshire Commission similarly recommended in 1874: 'That the Collections at the British Museum be maintained and arranged with special reference to the Geographical Distribution of Plants and to Palaeontology; and that the Collections at Kew be maintained and arranged with special reference to Systematic Botany' (1874 [C. 884], p.23).

[21] The science collections were transferred to the opposite side of Exhibition Road in 1872, although the Science Museum was only officially inaugurated in 1893.

[22] 1872 [C.536] *Op. cit.,* p.435

Despite the shared interests of the two institutions, Hooker claimed not to perceive South Kensington as a competitor because the balance between specimens and manufactures was tipped in favour of the latter at South Kensington, and in favour of the former at Kew, but more importantly, because the organising principles adopted at the two museums represented different disciplines.

There was a further significant addition to the South Kensington exhibitionary landscape in 1887 with the arrival of the Imperial Institute (Figures 6.8 and 6.9). Inaugurated with the object of 'the utilisation of the commercial and industrial resources of the Colonies and India, and other parts of the Empire', the Institute aimed to provide 'comprehensive collections of their natural products and of such products of other nations, and collecting full scientific, practical and commercial information relating thereto' (cited in Dunstan 1903, v). The remit sounds uncomfortably close to that of the Kew Museum, and it is interesting to note that Kew was not consulted in the preliminary stages and that not surprisingly Thiselton-Dyer's initial reaction to it was somewhat frosty.[23] It was at his request that a definition of the different purposes of the two institutions was given:

> The assistance given by the Secretary of State in Council to the Imperial Institute is intended to enable it to provide for the manufacturers and merchants of the United Kingdom universally accessible information regarding the general commercial life of India; whereas the grant to Kew is made in return for scientific services rendered directly to the Secretary of State for India, and to the Government of India.[24]

[23] Letter to J. R. Royle, 6 June 1891: 'It looks as if you had got the rather dismal job of recreating an Indian Museum at S. Kensington'; RBGK Archives, MR/37 Imperial Institute: Reports, Press Cuttings 1887-1902, f.6

[24] Letter from A. Godley, India Office to W. Thiselton-Dyer, 30th June 1891, RBGK Archives, MR/37 etc., f.15

The India Office, it appeared, conceived Kew's raison d'etre less in terms of 'museological' science or its relations with the commercial sector than of an 'experimentalist' model of science, in collaboration with various agencies of Indian government (Pickstone 1994, 113). A more productive period of détente followed once Thiselton-Dyer was elected to the Governing Body of the Institute's Indian Section in 1891. J. R. Royle, the son of John Forbes Royle, had been seconded from the India Office to establish the Indian Section, and visited the Kew Museums later that year.[25] This was undoubtedly a factor in the Institute's decision, 'that the scheme to be adopted in the arrangement of the Collection representing the economic products of India should have a commercial and industrial, rather than a scientific bearing'.[26] The same memorandum outlined the groups of material to be collected and displayed at the Institute; timber formed one such group, introducing another timber collection into the metropolitan circuit. This had implications for Kew's role in acquiring specimens, in attracting audiences, and in maintaining its authority within economic botany, especially as South Kensington was considerably more convenient for city merchants than the pleasure grounds of suburban Kew. In 1896, with the opening of its Scientific and Technical Department, the Institute enhanced its scientific authority and strengthened networks with the British commercial sector and colonial institutions of economic botany.

Colony

A particularly significant relationship developed between the Imperial Institute and the Industrial Section of the Indian Museum at Calcutta. The relationship hinged upon the person of botanist George Watt, Reporter to the Government of India on Economic Products from 1887 to 1903, who was based at the Calcutta Museum. To begin with, the Indian exhibits at the Imperial

[25] Letter from J. R. Royle to W. Thiselton-Dyer; RBGK Archives, MR/37 etc., f.16

[26] Memorandum from F. A. Abel, Secretary of the Imperial Institute, February 29, 1892; RBGK Archives, MR/37 etc., f.134

Institute were named and arranged 'so as to correspond exactly with those of the Calcutta Museum', each specimen being identified and described by Watt before transfer to the Institute by reference to his *Dictionary of the Economic Products of India* (Watt 1889-96). The origins of Watt's ten-volume *Dictionary* lay in international exhibitions and in the work of Trailokya Nath Mukharji at the Agriculture Department (Figure 6.10).

The Department of Revenue and Agriculture had been created in 1871 by the Indian Government to 'collect, collate, and disseminate information as to the condition of India in its agricultural respects' (cited in Hoffenberg 2001, 50). Mukharji, who was of the Brahmin caste, was employed by the Department as an exhibition official and collector for colonial exhibitions in the 1870s and 1880s.[27] As he accumulated and dispatched collections to world's fairs, and, incidentally, also to the governments of other nations such as Italy and Belgium who requested 'sample collections of commercial products' (Watt 1881, iii), he compiled an 'index collection' of specimens in small, glass-fronted tin boxes (Figure 6.11) and a list of the economic products of India. He also authored the official publications accompanying Indian products at the Amsterdam Exhibition of 1883, the 1886 Colonial and Indian Exhibition, and the 1888 Glasgow International (McKeich 2008, 2). He was one of numerous Indian experts employed by the Department, but he was unusual in travelling overseas as an official representative of the Indian government at exhibitions. Whilst in London for the Colonial and Indian Exhibition of 1886 he also participated in a number of debates on India at the RSA, and delivered public lectures (Hoffenberg 2001, 52-54). He even visited Kew (Mukharji 1889, 321). As we have seen, he developed networks beyond the British metropole-colony framework; he is, for example, a key figure in the development of trade

[27] Museum Victoria website accessed 27 August 2012 at: http://museumvictoria.com.au/collections/themes/1188/t-n-mukharji-collection

between India and Australia in the late nineteenth century (McKeich 2008, 2). Mukharji was an active agent in the systematic classification of Indian products and in the representation of India at home and abroad, such that the knowledge thus produced was as much local and national as it was imperial.

In advance of the Calcutta Exhibition of 1883-84, Watt was seconded to the Bengal Government, assisted by Mukharji. With the London Colonial and Indian Exhibition of 1886 already in their sights, the Imperial Government agreed to Watt's retention to compile the *Dictionary*, whilst Mukharji was charged with growing the index collection. Thus exhibitions brought the *Dictionary* and its associated collections into being, but equally the book and the collections enabled Indian participation in future exhibitions with expanded collections, scientifically arranged and with supporting knowledge. Watt used a range of sources in naming plants, rather than what had by then become the taxonomy adopted at Kew – Bentham and Hooker's *Genera Plantarum* – a copy of which he only received half-way through the writing process.[28] In his desire to enumerate as many plant varieties as possible, a number of entries bear only the indigenous name(s). Watt's *Dictionary* is essentially a compendium of previous writing on the subject and anecdotal evidence gathered from colonial officials across British India, rather than 'original and personal investigation' (Watt 1881, iii). The work is alphabetically arranged by genus (rather than in taxonomic order), with the various species listed under each generic heading, thus rendering it more accessible to non-specialists. Data is displayed in the following order: Latin name; vernacular names; citations; details of habitat; a 'botanic diagnosis' or brief description; and finally properties and uses. Applied knowledge was the author's aim, and intellectual accessibility for the 'administrative officer' and the 'reader in search of definite information regarding Indian economics' (Watt

[28] Hooker 1872-97; Bentham & Hooker 1862-83; Candolle 1852; Roxburgh 1832; Kurz 1877; Thwaites 1858; Dalzell & Gibson 1861; Stewart 1869, 1874; Gamble 1881 (Watt 1881, viii)

1881, iii). As Hoffenberg argues, the *Dictionary* was part of a larger project to circulate India which resulted from the convergence of a number of discourses: medicine, botany, bureaucracy, manufacture, commerce, and art. But it did not fit the discipline of economic botany as constructed by the Kew Museum – one that was founded on a scientific basis – and did not form part of the Kew 'canon' of economic botany texts.[29]

The Indian Museum, Calcutta, where Mukharji's economic botany collections came to reside permanently, was one of a number of Indian museums which predated those at Kew. It was founded in 1814 largely due to the energies of Dr. Nathaniel Wallich, who was then Superintendent of the EIC Botanic Garden at Shibpur.[30] It grew out of the Asiatic Society of Bengal, of which Wallich was an active member, and its first incarnation was as the Oriental Museum of the Asiatic Society. Many of the earliest accessions came from members' donations, both European residents and Indian members (Chakravarti 2004). One of these, Raja Lalla Mittra, was later responsible for a catalogue of the Museums 'curiosities' in 1849.[31] The Museum moved into new premises in 1878 (Figure 6.12). As a result of the 1883 Calcutta International Exhibition the Museum greatly augmented its economic collections, and also acquired those of the former Bengal Economic Museum. In 1887 Mukharji was appointed Assistant Curator of these collections, reporting to Watt who in turn became Reporter to the Government of India on Economic Products, and Superintendent of the Industrial Section in 1894 (Chakravarti 2004, 63-65). A dedicated permanent wing was eventually opened in 1901. The new Economic Court displayed both raw products and industrial exhibits, according to the Kew method. Unlike Kew, however, the

[29] It was not, for example, used as a source in the re-arrangement of Museum No. 3 in 1926 (RBGK 1927, 3).

[30] Usually written as 'Sibpur' in 19th century sources

[31] RBGK Archives, MR/164, Annual Report of the Indian Museum Industrial Section for the Year 1909-1910

collections were organized by product type such as fibres, gums and resins, and timber, a system more suited to the needs of the merchant than of the scientist (Figure 6.13).[32]

From 1900 onwards, there was a move away from London paradigms of collection, organization, and display and the documentary record suggests a new confidence in Indian museology with Calcutta taking the lead. The Indian Museum hosted a number of visits from overseas museum professionals; its advice was sought, for example, by Professor Rusby of New York 'in connection with his own rising Museum of economic botany'.[33] During 1902 and 1903 I. Henry Burkill, Superintendent of the Industrial Section, was able to claim: 'I visited seven Museums in different parts of India…It is my endeavour to induce these Museums to fall into line with the Indian Museum in the matter of size of exhibit and manner of putting up, so that exchange and mutual help may be easy'.[34] And in 1907 a conference of Indian museums was called by the Calcutta Museum at which a number of resolutions was passed including that 'the systematic exchange of duplicates and of reproduction of unique specimens between the Indian Museum and the Provincial Museums would be beneficial to both from a scientific and an economic point of view'. The only reference to the world beyond India relates to type specimens: all botanical 'types' were to be placed thenceforth in charge of the Director of the Indian Botanical Survey in Calcutta, whereas previously they may equally have gone to overseas herbaria.[35]

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[32] RBGK Archives, MR/164, Annual Report of the Indian Museum Industrial Section for the Year 1901-1902

[33] RBGK Archives, MR/164 etc., Annual Report etc. 1901-1902

[34] RBGK Archives, MR/164 etc., Annual Report etc. 1902-1903

[35] RBGK Archives, MR/163 Report on the Conference as regards museums in India: held at Calcutta on December 27th to 31st 1907

3. The India Museum timbers 1879

The 1879 letter in which Birdwood explained the India Museum's system of specimen acquisition had more urgent news to relate: he had been called on to submit to Sir Louis Mallett, Secretary of State for India, 'notes of a plan for getting rid of the India Museum'.[36] Birdwood's proposal to transfer all the 'economic vegetables' to Kew was approved by the Secretary of State and the Board of Works, and Kew took delivery of the India Museum's entire economic-botanical collections in October 1879. Kew had previously dealt with nothing of such magnitude; the forest produce alone included over 3,000 timber specimens weighing thirty-six tons, which were delivered by barge up the Thames (Desmond 1982, 185). Kew was also invited to select from the Art Section of the Museum a number of objects, presumably once South Kensington had had first refusal. Their selection consisted of seventy-eight artefacts ranging from models to musical instruments, and these were accessioned with the rest of the donation between October 28th and November 27th 1879.[37] The India Office agreed to pay the total expenses of removal, and to award Kew £2,000 towards the building of an extension to Museum No. 1, to accommodate the new material (Figure 6.15). Furthermore, it made available a grant of £200 per annum for maintenance costs and the services of 'cryptogamist' Dr. Mordecai Cubitt Cooke – a former India Museum curator – to Kew for three days a week over a five year period, contributing £200 a year towards his salary (Hooker 1880).

The year-long sorting process took place in two temporary sheds. The woods which pre-dated the John Forbes Royle era (pre-1838), where labeled, bore the Latin binomial and little else besides, making for a rather minimal description. They were intercalated into the Kew Museum collection in one of two ways. If

[36] Letter from George Birdwood May 26 1879 to Joseph Hooker; RBGK Archives, Kew India Museum 1875-92, f.3

[37] RBGK EBC, Museum Entry Book 1879-81, EBN 1879.89

of a species not previously represented in Museums 1 and 2, then they were inserted into the appropriate systematic position within those Museums. If large, and not required in Museums 1 and 2, they were displayed geographically in Museum No. 3. It is uncertain how the woods had been displayed at India House: in general economic botany specimens were arranged there 'according to their properties' to facilitate their use to manufacturers (Royle 1851, 588).

Once Kew had made its own selection, the remaining duplicates were redistributed. A list of the principal recipients can be seen at Figure 6.14 and reveals the geographic and epistemological range of Kew's circulatory networks. The Kew Museum shaped economic botany as a 'permeable' discipline (Whitehead 2009) so that it could exchange knowledge with contiguous fields, whilst maintaining a sense of difference from other disciplines and institutions. The list also serves to highlight the Kew Museum's role as clearing house. The second clause of the agreement reached between the Secretary of State and the Office of Works had stated:

> B. That the Kew authorities shall be at liberty to apply the collections thus transferred at their discretion, in the manner best suited for improving the utility of the Kew collections; and that anything remaining after a selection has thus been made shall be distributed to other scientific institutions in Great Britain and elsewhere it being understood that a preference shall be given to any institutions which may be named by the Secretary of State as the distribution proceeds.[38]

However, in reality the transfers proceeded more by a process of negotiation than allocation. In November 1879, at the request of Birdwood, a file containing the 'applications to share in any distribution which may be made of

[38] BL IOR Mss Eur F195/33. 'Conditions agreed upon between the Secretary of State and the Office of Works with respect to the transfer of the India Museum to Kew', 16 August 1879

the collections in the India Museum' was forwarded to Thiselton-Dyer. These were requests from individual institutions which had heard from various sources – including *The Times* – of the imminent fate of the India Museum.[39] The City Industrial Museum in Glasgow, one of the first of the claims on the India Museum collections to be 'settled', is a case in point. Thiselton-Dyer was aware of 'a long-standing undertaking' between the India Museum and Glasgow which had been in existence since 1877. He therefore invited the curator James Paton to Kew in order to ascertain from him 'what objects *unsuitable for our Kew methods of exhibition* could be acceptable for the museum under his charge'.[40] Kew may have been awarded the status of passage point for the India Museum botanical collections, but collectively these requests, some appearing as fragments of prior agreements, compromised Kew's ability to exercise unchallenged authority as implied in Clause B.

Once Kew was in possession of the botanical collections, Thiselton-Dyer received requests directly, sometimes for particular types of objects, and sometimes less specifically, for 'such duplicate specimens of vegetable products as can easily be spared from your collections'.[41] Negotiation could also centre on the exchange of goods; a letter to Joseph Hooker from the U.S. Department of Agriculture thanked him for the 'collection of Indian woods….a very valuable addition to our economic Museum. In accordance with your desire to procure a plant of the Island Cotton, for exhibition in your Museum, we have given orders for a suitable plant, which at the proper season we shall take pleasure in forwarding to you'.[42] In short, museums presented their claims to the India

[39] Letter forwarded to Kew via India Office from Royal Botanic Society of London, 14 June 1879; RBGK Archives, India Museum 1875-92 Volume 1, ff.366-367

[40] Letter from Thiselton-Dyer to Louis Mallet at the India Office, 9 February 1880; BL, IOR Mss Eur F195/33. (Emphasis added)

[41] Letter from G. L. Goodale, Director of the University Botanic Garden of Harvard, 20 January 1880; BL IOR Mss Eur F195/34

[42] Letter dated 18 January 1880; BL IOR Mss Eur F195/34

Museum and to Kew, and Kew had to balance those claims with its desire to improve its own collections. At the request of the India Office, and to render greater access to the India Museum collections at Kew for India Office researchers, a small label bearing the words 'India Museum' was applied to each displayed object – about 4,000 in total (Hooker 1880, 59).

The woods presented a specific set of challenges; there were 3,358 specimens of which 2,318 were destroyed in the absence of any provenance details (Hooker 1880, 59). By 1880, the Kew Museum laid greater emphasis on local knowledge than had been the case at mid-century;[43] without context, scientific knowledge could not be produced. In his annual report Joseph Hooker seemed unperturbed by this large-scale disposal; the Kew Museum already had a good collection of Indian Woods from the Indian Forest Department, 'accurately determined by its scientific officers' (Hooker 1880, 59).[44] However his unpublished correspondence reveals a different story. The woods received from the India Museum were stamped with numbers which Kew Museum staff took to refer to an inventory or catalogue.[45] Kew's increasingly urgent requests for this documentation met with no success; the woods catalogue could not be found.[46] Of the 1,040 specimens not destroyed, a mere fifty-one were retained at Kew; 121 were sent to the Botanical Department of the BM;[47] 281 to the museum of the Arnold Arboretum at Harvard; and, as we have seen, the Schlagintweit woods were returned to India (1880, 59).

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[43] The early entries in the first Museum Entry Book (1847-1855) are noticeably sparse on contextual data.

[44] The 1878 Paris duplicates

[45] Letter from Thiselton-Dyer to Sir Louis Mallet, India Office 7 February 1880; BL, IOR Mss Eur F195/33

[46] In 1881, it was discovered by John Forbes Watson amongst his own papers and sent to Kew (Desmond 1982) but not before the destruction of the majority of the specimens.

[47] A number of these were transferred back to Kew in 1983; Museum Entry Book 1974-86, EBN 20.1983: 'Hundreds of wood specimens; selected by Kew Museums' Staff from the B.M.'s storage rooms at Ruislip in February and March 1983'.

Hooker was keen to emphasise the increased access that the Indian collections would enjoy at Kew but also the benefits of a 'more extensive and complete [display] than that which was originally open to the inspection of the public at South Kensington', by which he meant that comparative evaluation could result from the juxtaposition of the Indian specimens alongside those of other colonies and 'foreign countries' (Hooker 1880, 59). For Kew the transfer had brought about 'the reinforcement of the Indian element in the Museums' (RBGK 1886, 5); they had acquired new specimens of raw materials and manufactures, as well as botanical artworks and display cases; they had been enabled to extend Museums No. 1 and 2 to accommodate them; a re-arrangement of Museum No. 1, and the movement of the cryptogam collection to Museum 2, 'for the first time brought together and arranged in proper sequence' (Hooker 1881, 53), were further consequences; and Kew had gained new expertise for the collections as a whole with the secondment of Cooke and the appointment as museum *préparateur* of George Badderly, also from the India Museum.[48]

Kew had readily accepted the role of sorting and distributing the India Museum botanical materials. The task demonstrated to the museum community the trust placed in Kew's scientific authority by the India Office. Kew intercalated into its own collections those items it required, but the majority of the specimens were briefly evaluated there, destroyed, or forwarded to other institutions – institutions with whom Kew could negotiate for specimens in exchange, or which presented claims to Kew, clearly considering the India Museum collections as joint stock to be dealt equitably. As we have seen, prior to the India Museum clearances, Kew had had no direct access to the EIC networks of supply; the movement of objects from India to the India Museum had been something of a closed shop. But in the meantime Kew had

[48] Prior to this all work such as mounting specimens was performed by the museum attendants who were not especially qualified for the task (Hooker 1880, 59).

been seeking ways of building a representative collection of Indian woods, and it found one via the Indian Forestry Department.

4. The rise of Indian forestry

Kew was involved in the Indian Forestry project since its inception. Gregory Barton has described the meeting in 1847 of Joseph Dalton Hooker with the new governor-general of India – the Earl of Dalhousie – when they were fellow passengers on the boat to India, Hooker to set out on his Himalayan expedition and Dalhousie to take up his new post in Calcutta (Barton 2002, 49-50). According to Barton, Hooker impressed Dalhousie with his knowledge of the relationship between deforestation and climate change, based on his observations on St. Helena. A correspondence arose between the scientist and the governor, with Hooker effectively in the role of Dalhousie's advisor on sustainable forestry between the years 1847-50. In 1856 Dalhousie, convinced of the need for centralized control of Indian forests, appointed German botanist Dietrich Brandis as Superintendent of Forests in Burma, promoting him in 1864 to first Inspector-General of Indian forests.

Links between the Indian Forestry Department and Kew were strengthened by an episode of happenstance which is not uncommon in narratives of imperial careering – the occurrence of illness and extended leave-taking. Brandis was on sick-leave in England between 1872 and 1873, and was thus called on to complete John Lindsay Stewart's *The Forest Flora of North-West and Central India* at Kew.[49] That the relationship which developed between Brandis and the Royal Botanic Gardens was a fruitful one is evidenced by the fact that an accession of timber from Brandis was recorded in the Museum Entry Book in

[49] David Prain, 'Brandis, Sir Dietrich (1824–1907)', rev. M. Rangarajan, *Oxford Dictionary of National Biography*, Oxford University Press, 2004 [http://www.oxforddnb.com/view/article/32045, accessed 9 Feb 2012]

April 1873 whilst he was still at Kew.[50] The two cases of Burmese wood received from the India Museum had been sent by Brandis to the 1862 London International Exhibition and had laid in the India Museum stores in the intervening period.

As we saw in Chapter Five, from the 1870s there existed an arrangement between Kew and the Indian Forest Service for newly-qualified forestry officers to study the Kew Museum collections before leaving for India. On the one hand Kew was fulfilling its instructive function, whilst at the same time reinforcing networks of exchange. In 1878 Brandis established the Dehra Dun School of Forestry to train local students to be forest rangers, and graduates of the Thompson Civil Engineering College to become sub-conservators, and strong links were established between the new School and Kew. The timing was somewhat fortuitous for Kew and its Museum; the India Museum was about to be dissolved, and its collections and specialist staff dispersed, and the Imperial Institute was not yet established. As with the Indian botanic gardens, Kew's relationship with Dehra Dun was ranged along lines of mutual benefit. Dehra Dun's requests to Kew typically concerned specimen identification and nomenclature, desiderata for its herbarium, exchanges of journals and seeds, proofing of manuscripts, and horticultural advice. As for the Kew Museum, the Forestry School provided the means to achieving a representative collection of Indian timbers. Indeed, the reason that Joseph Hooker was so ready to order the destruction of the India Museum woods was because, 'even with identifications they are now pretty completely superseded by the copious and authentic collections which have been lately received from the Indian Forest Department'.[51] These were a duplicate set of woods prepared by the Department for the Paris Exhibition of 1878.

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[50] RBGK EBC, Museum Entry Book 1861-79, EBN 30.1873

[51] Letter from Thiselton-Dyer to Mr. Pedder at the India Office, 25 February 1880; RBGK, India Museum 1875-92 Volume I, ff.153-158

The Paris Exhibition duplicates 1878

The Paris Exposition Universelle of 1878 was larger than any previous international exhibition, signalling French recovery since the 1870 Franco-Prussian War (Morford 1879, 17). Forestry was a key theme; and whilst the British timber displays were considered 'meagre' by one commentator, it was suggested that British colonial timbers compensated for their deficiencies (US 1878, 396).

In October 1878 Kew received from Brandis at the Indian Forest Department a 'Very large collection of woods, gums, resins, fruits, fibres, &c.'[52] It was a duplicate set of a collection formed for the 1878 exhibition. There were, when counted, over a thousand specimens in the donation, and they mark a transition at Kew to a more 'complete' representation of Indian woods in the collections. This 'magnificent collection of forest produce' comprised ninety-eight packages and consisted of '1,113 specimens of timber as well as a number of large rounds, planks, bark pieces, specimens of trees grown in plantations, bamboos, canes and other palms, gums, fibres, fruit, and other miscellaneous forest produce' (Hooker 1880, 56). They were examined, selected, and incorporated into the permanent collections in early 1879, and the duplicates distributed. The value of the collection lay in its breadth and presentation: each specimen was labelled with its botanical name (according to Kew's own Bentham-Hooker system and with reference to Joseph Hooker's *Flora Indica*), vernacular name, geographical provenance, and details of uses; in short, they had been 'accurately determined by its scientific officers' (1880, 59). This is an important point, since before the widespread use of microscopy it was notoriously difficult to identify unknown woods.

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[52] RBGK EBC, Museum Entry Book 1861-79, EBN 64.1878

James Sykes Gamble told the story of the Paris woods in his *Manual of Indian Timbers* (1881). The wood collection sent by India to Paris in 1878 was 'the most complete that has ever been formed in India and sent to Europe for exhibition' (Gamble 1881, i). Although the specimens were submitted by the Forest Officers of Local Governments, their eventual uniform presentation owes to the fact that Brandis requested rough wood specimens, the preparation of which he supervised in a central workshop, firstly in Simla and then in Calcutta. There were sufficient submissions to provide a number of duplicate sets; the two most 'complete' of these were sent to the office of the Bengal Conservator of Forests at Darjeeling and to the museum at the Forest School of Dehra Dun – indeed, it seems not unlikely that Brandis's estimates had allowed for a full set of timbers for the fledgling School. Further sets were distributed to Kew and to other museums in Europe and North America (Gamble 1881, i). At the same time, the Department sent its first consignment of Indian timbers to London to be auctioned on the open market and they obtained 'good prices' (Ellis 1888, 39). The appearance the following year, therefore, of a comparable set of woods in Museum No. 3 enabled commercial visitors to build on existing knowledge, whilst aligning the Kew Museum with the Indian Forest Department and the commercial agenda of empire.

The Forest Department's involvement in international exhibitions formed part of a strategy to address the under-evaluation of Indian forests; by the 1860s botanists knew of twelve hundred species of Indian trees yet the market consisted mainly of teak, deodar, and sal (Barton 2002, 73-75). Marketing a greater range of woods would reduce wastage and increase the revenue per forest acre. With the opening of the Dehra Dun training school in the same year as the Paris exhibition, the exercise of collecting and preparing the woods for international consumption can be seen as emblematic of this new order.

The 1878 woods are noteworthy for their detail of local names – 'selected with as much care as possible and with the spelling given according to the most ordinary system and the pronunciation of the word' (Gamble 1881, viii) – and local usages. The Indian Forest Department had the advantage of direct access to indigenous knowledge of tree species through daily dialogue with Indian forest rangers who were trained at the Dehra Dun Forest School (FRI 1961, 106). In the field, forest conservators could observe local practices at first hand, and when at HQ, accumulate information from a distance via their rangers. From 1891, with the establishment of the Provincial Forest Service, a cadre of Indian forest officers was formed, thus increasing access to local knowledge in the higher ranks of the Department. The result was an exchange of Indian and European knowledges, and a co-constitution of a new, imperial forestry through 'reciprocal, albeit asymmetric, processes of circulation and negotiation' (Raj 2007, 13). The system of ledgers at the former Imperial Forestry Institute illustrates how this knowledge was collated and recorded – in the form of handwritten notes of verbal accounts and personal observations, circulars, photographs, journal articles, and reports.

Beyond the completeness and uniformity of the 1878 collection, its significance lies in its presentation and in the new terminology used to describe the qualities of the woods and their applications. As regards the former, the woods followed a convention of being polished on the upper side to reveal the grain, and untreated on the lower side to facilitate recognition by those involved in the wood trade. There was no bark unless it was of commercial interest. This convention owed more to the xylaria of European forestry schools than it did to public museums. Brandis had studied forestry at Göttingen and his Burmese woods prepared for the 1862 International Exhibition conformed to the same principles. Gamble had also trained in Europe – at Nancy – as did other British officers in the Forest Department from 1867 to 1884, and all were familiar with forestry school conventions of presenting woods. As for

terminology, it was already the practice at the Kew Museum to specify usages, but with the advent of the 1878 woods this took on a new precision and a new commercial register. The label on EBC 13909 – *Premna longifolia* Roxb. – indicates that it was 'used for house-posts'; and EBC 6591 – *Ougeinia dalbergioides* Benth. – was 'tough, durable, and takes a beautiful polish'. This was the language of the timber merchant, not, hitherto at least, that of the botanical museum. It is almost impossible to imagine such qualifying statements on the woods collected in the 1850s by Joseph Hooker. Those woods were decidedly natural history specimens prepared by a botanist, with their cross sections indicating the appearance of the living tree; the 1878 woods were timber samples prepared by foresters. At the 1878 Exhibition they represented the objective of the Indian Forest Department of expanding the Indian timber market to a wider range of species; in Museum No. 3, taken as an assemblage of botanical, indigenous, and commercial knowledges, they were indicative of the discipline of economic botany as it had evolved by the last quarter of the nineteenth century.

Gamble's *Manual,* the research for which was conducted on the 1878 woods, was the outcome of a project to provide a 'definitive' textbook for Indian foresters. It was commissioned by the Indian Government at the suggestion of Brandis. As an officer of the Service, Gamble had already had experience of Burma and Bengal, and through this and his avid collecting activities, had gained considerable knowledge of the breadth of the Indian flora, aided by local consultants.[53] As with international exhibitions, the government's aim in financing the work was to increase awareness of the vast range of Indian woods. The *Manual* provided technical information on this biodiversity, specifically 'the structure, growth, distribution, and qualities of Indian woods'

[53] Amongst those he names are: 'Sulpiz Kurz, then Curator of the Calcutta Herbarium, helped me very largely with the naming.... a Lepcha collector whom I employed privately and who did splendid work for me' and ' friends like Mr. C. G. Rogers, Pundit Keshvanand and Rai Bahadur U. N. Kanjilal added many of value' (RBGK 1926, 14-15).

(Gamble 1881). Insofar as it aimed to cater to the economic botanist, the forester, and to the trader, and particularly in its use of the Bentham-Hooker taxonomic system as an organizing framework, it can be seen as a textual equivalent to the Kew Timber Museum.

The *Manual* became a standard textbook for forestry students and was used as a reference in the re-organization of the Timber Museum in 1926 (RBGK 1927, 7). Its success can be gauged by the fact that in 1902 Arthur Godley, the Under-Secretary of State for India, wrote to Thiselton-Dyer at Kew, asking him if he thought it worthwhile to issue a second edition. Thiselton-Dyer's response suggests that, at this date, the need for the book was greater than ever:

> The world's supply of timber from temperate countries is gradually approaching exhaustion. Indian woods are at present comparatively little utilized in commerce. But their usefulness will be gradually developed…The information which he [Gamble] has given will enable traders to select and enquire for Indian woods which will suit the purposes of various industries.[54]

A third edition was issued in 1923.[55]

The case of the 1878 woods reveals the movement of objects across global exhibitionary circuits in the late nineteenth century to be one of circulation rather than unilinear supply – multilateral and curvilinear, negotiated throughout through processes of exchange. One is here reminded of the multiple volumes of Indian textiles – or 'mobile museums' – prepared by John Forbes Watson in the 1860s and '70s. These were circulated in London, in British and European textile-manufacturing towns, and in India, producing

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[54] Letter from Thiselton-Dyer to Arthur Godley, December 23 1902; RBGK Archives, MR/110 India Office (Misc.) 1869-1928, f.166

[55] *The Times*, October 20, 1925

different knowledges according to their display context (Driver & Ashmore 2010). Similarly multiple sets of the 1878 woods were distributed across India, Europe and North America, doubtless producing divergent, site-specific knowledges; what may have represented the British Empire as resource to the mother country in Kew's Museum No. 3, might simultaneously have signified potential transplantation projects when displayed in other European cities. From the Forestry Department's perspective, circulating the woods was both a structural requirement as a department of the Indian Government, and a means to new networks of forestry, trade, science, and collection. In this instance it is they who were acting as clearing house – both settling claims on their woods from institutions of British government, including Kew, whilst acquiring new commercial, scientific, and museological knowledges through the processes of exchange and negotiation.

5. Conclusion: trajectories and circuits

In considering the movement of objects from, to, and around British India, the contrast between notions of circuit and trajectory is enlightening (Roche 2011). 'Trajectory' is a concept originating in physics; it pertains to that which is thrown through space, or to the curve described by a projectile in its flight through the air. It is a term which occurs regularly in the discourse of object biography; as Arjun Appadurai states in *The Social Life of Things*: 'we have to follow the things themselves, for their meanings are inscribed in their forms, their uses, their trajectories. It is only through the analysis of these trajectories that we can interpret human transactions and calculations that enliven things' (Appadurai 1986, 5). 'Circuit' on the other hand, describes the action of going or moving round or about; a circular journey, or course – in effect, a return to point of origin. It is because Indian institutions of science, with motivations in large part independent of Kew, were co-actors in the history of collecting India that objects like the Schlagintweit woods could make

the circuitous journey from the regions of India to London which was to end with the restitution of the woods to the Indian Forestry Department at Dehra Dun.

The records do not indicate the number of objects which the Kew Museum restored to their land of origin in the same way, but this chapter has delineated the journeys taken by selected groups of objects, revealing that in effect India did not travel in straight lines, but in curved ones with a tendency to bifurcate, and occasionally in complete circles. This focus on the precise movements of objects through space has led to a problematisation of the notion of 'supply' as defined by Lindley in 1838. Objects did not flow unilaterally from Kew to museological or botanical peripheries, nor was the opposite true: colonies did not merely render specimens to the Kew Museum as a form of latter-day imperial tribute. Kew's position as clearing house involved both responding to and settling claims from certain institutions, and in negotiating exchanges with others. Furthermore, this position itself required constant re-negotiation, according to the dynamics of the exhibitionary complex. Collecting India was a competitive field, with new entrants to the marketplace throughout the long nineteenth century. The Kew Museum, as a primary site for the cultivation of economic botany as a scientific discipline, needed comprehensive collections and it is for this reason – to fulfil its disciplinary agenda – that it readily undertook the duty of 'supply'.

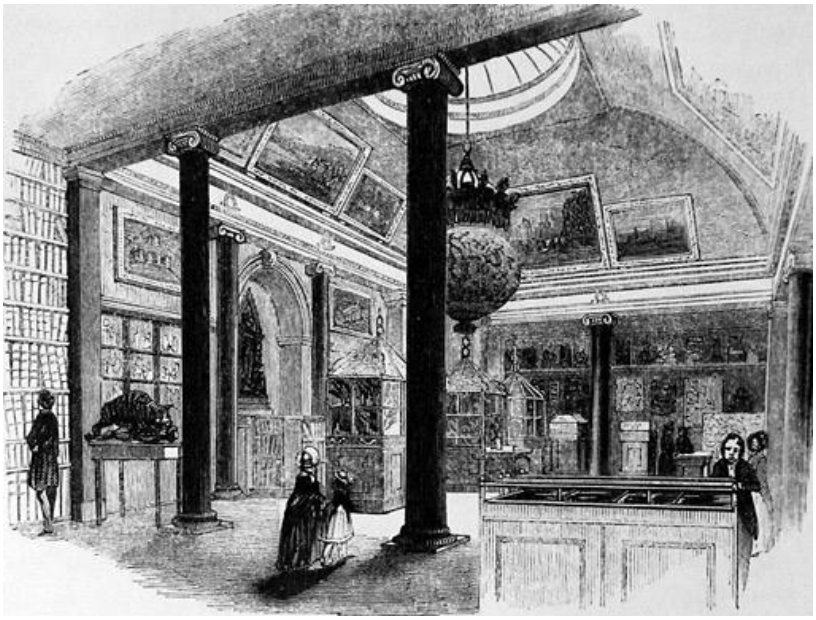


Figure 6.1 India Museum, East India House, Leadenhall Street 1843

Source: Knight 1843

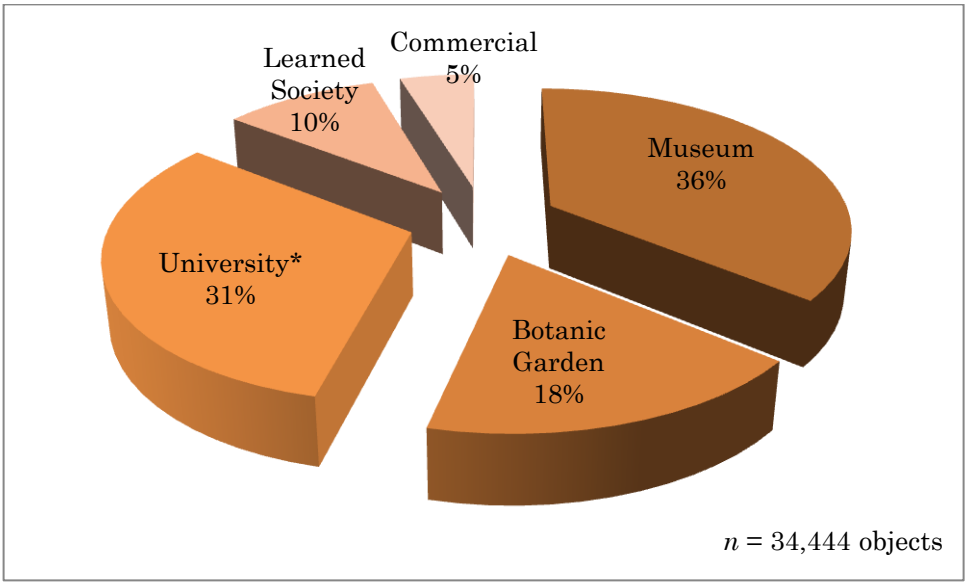


Figure 6.2 Objects distributed from Kew Museum to 'kindred institutions' 1881-1914

Source: RBGK EBC, Kew Museums Distributed Specimens

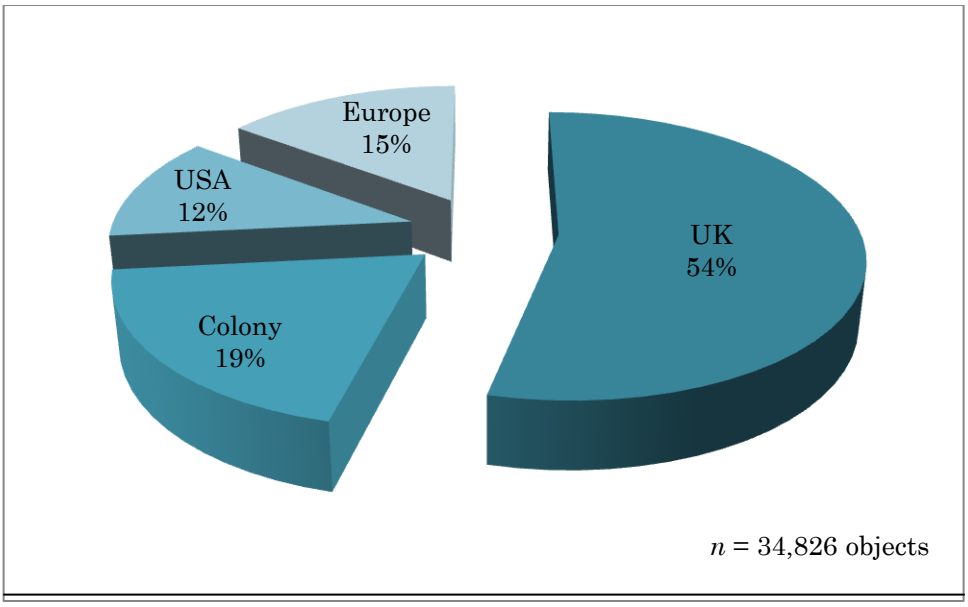


Figure 6.3 Objects distributed from Kew Museum by geographical destination 1881-1914

Source: RBGK EBC, Kew Museums Distributed Specimens

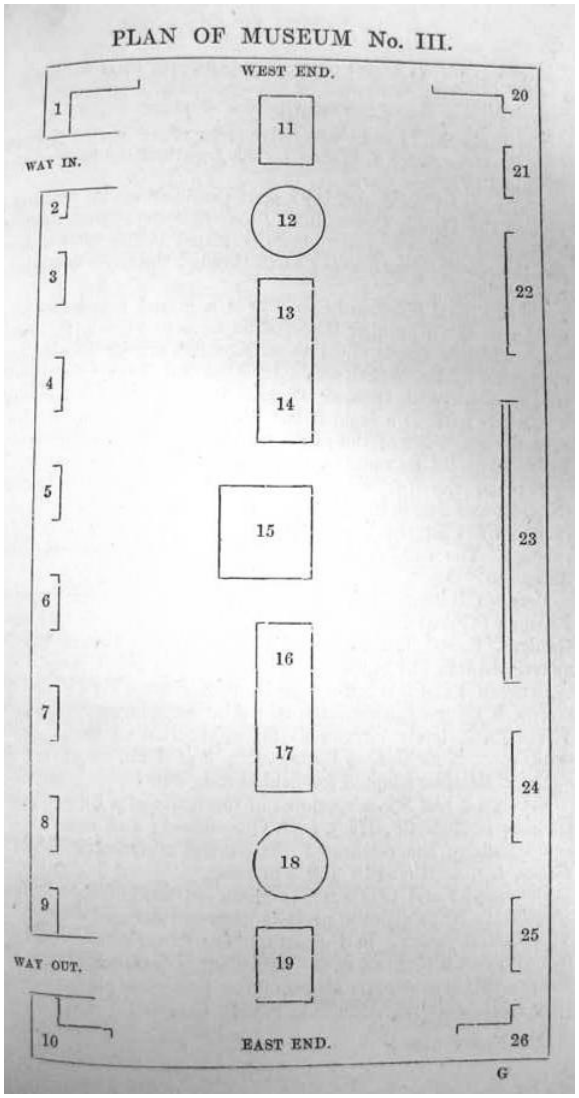


Figure 6.4 Plan of Museum No. 3 1866

Key to case numbers: 1. Trinidad and British Guiana 2. British Guiana 3. British Guiana, Honduras, etc. 4. Chiefly West Africa (collected by Mr. Gustav Mann). 5. Planks of Deodar (Cedrus Deodara) and tall stems of Tree Ferns. 6. Ditto, ditto. 7. Chiefly Japan (from the Collector for the Gardens). 8. Canada, etc. 9. Canada. Observe a fine slab of the White Pine (Pinus Strobus, L,) 10. Victoria 11. West India and Algeria. Also a case of Vegetable Resinous Products, from Messrs. Wallis, Long Acre 12. Bowl-like formation from the root of the Double Cocoa-Nut LodoiceaSeychellarum. 13. Collection of Woods from Tuscany 14. Series of British-grown Woods… 15. Tasmanian Timber Trophy. 16. Bahamas, Ceylon, St. Helena, Guatemala, etc. 17. Ceylon, etc. 18. Canada and British Columbia. Observe fine Sections of Canadian White Oak (Quercus alba, L.), and of the Douglas Fir (Abies Douglasi, Sab.), of British Columbia. Also a magnificent Section of the Common Oak (Quercus Robur, L.), grown in Denmark. 19. New South Wales and Victoria. 20. Queensland. 21. New Zealand. 22. Natal. 23. Tasmania. 24, 25 & 26. New South Wales.

Source: Oliver 1866 ©RBG, Kew

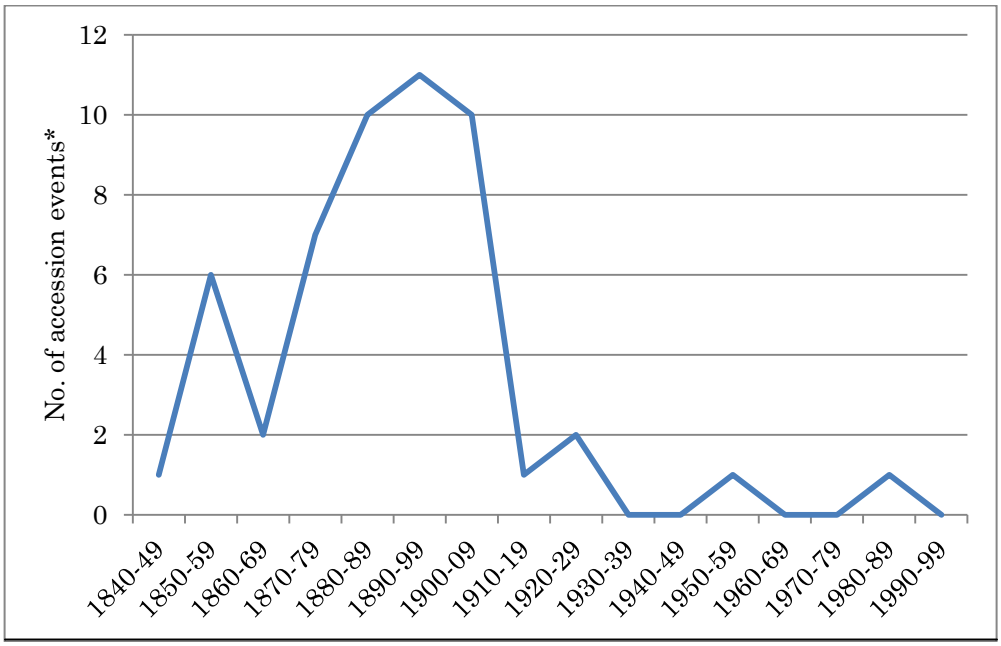
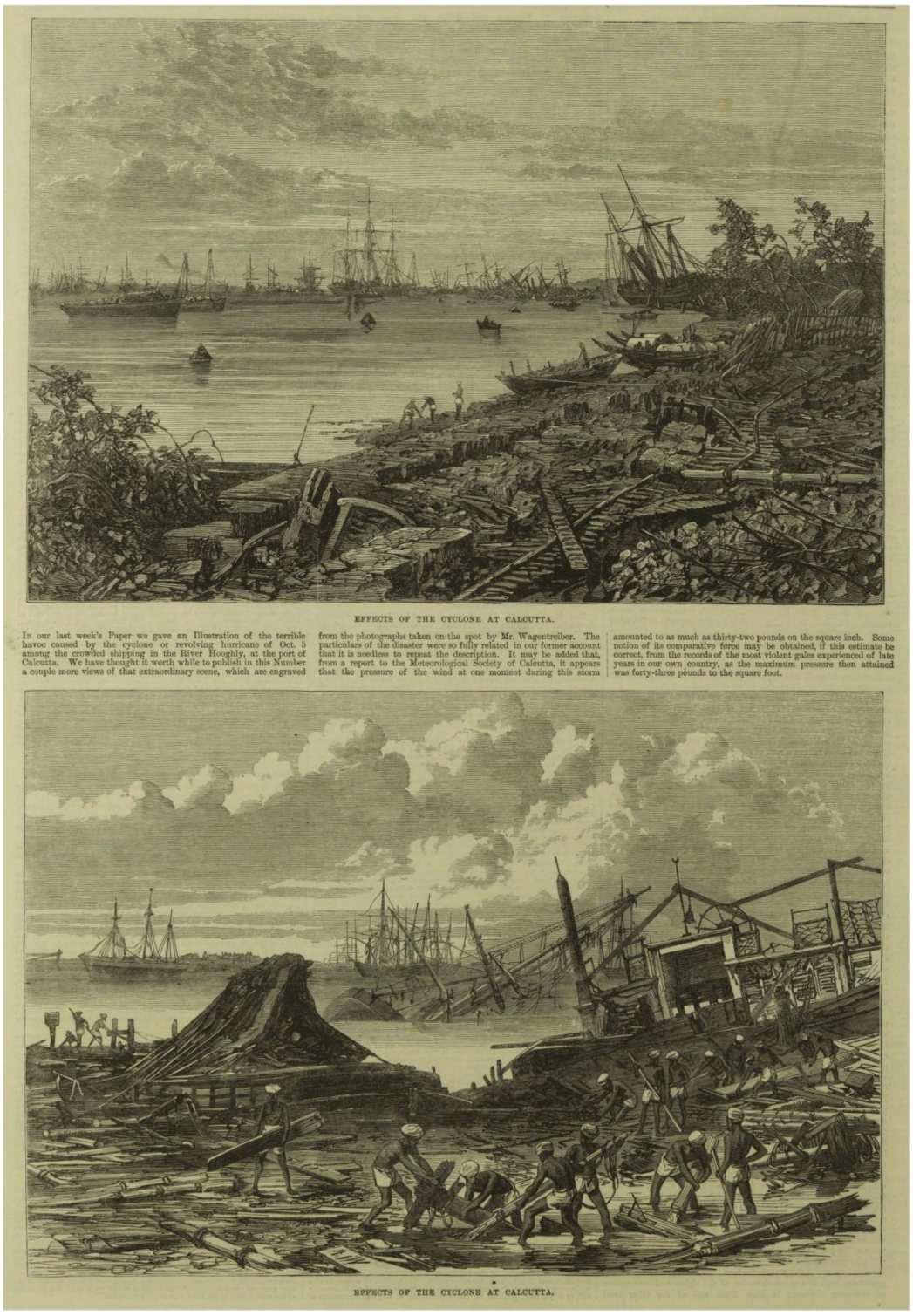


Figure 6.5 Indian wood accessions into the Kew Museum

*See note to Figure 3.7

Source: RBGK EBC, Museum Entry Books



EFFECTS OF THE CYCLONE AT CALCUTTA.

In our last week's Paper we gave an Illustration of the terrible havoc caused by the cyclone or revolving hurricane of Oct. 5 among the crowded shipping in the River Hooghly, at the port of Calcutta. We have thought it worth while to publish in this Number a couple more views of that extraordinary scene, which are engraved from the photographs taken on the spot by Mr. Wagentreiber. The particulars of the disaster were so fully related in our former account that it is needless to repeat the description. It may be added that, from a report to the Meteorological Society of Calcutta, it appears that the pressure of the wind at one moment during this storm amounted to as much as thirty-two pounds on the square inch. Some notion of its comparative force may be obtained, if this estimate be correct, from the records of the most violent gales experienced of late years in our own country, as the maximum pressure then attained was forty-three pounds to the square foot.

EFFECTS OF THE CYCLONE AT CALCUTTA.

Figure 6.6 'Effects of the Cyclone at Calcutta'

Source: *Illustrated London News* November 26, 1864 ©2012 Gale

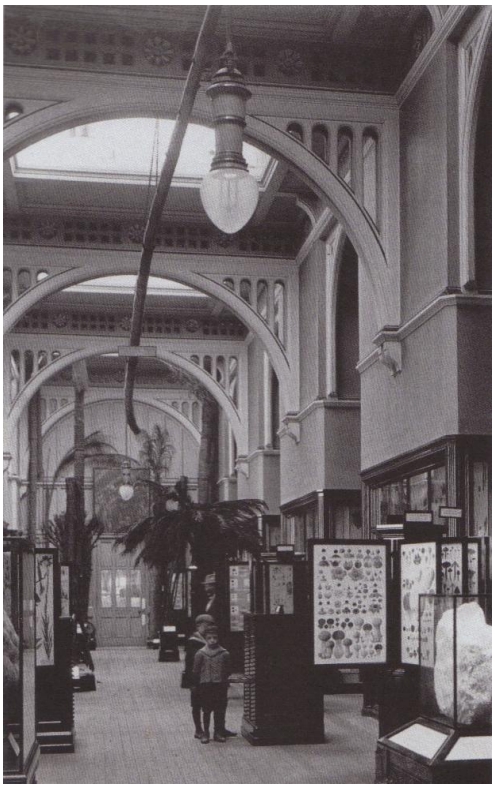


Figure 6.7 Botany Gallery, British Museum (Natural History) 1911

Image courtesy of The Natural History Museum, London

Figure 6.8 Imperial Institute

Wikimedia Commons / Public Domain

Figure 6.9 Indian Galleries, Imperial Institute 1893

Source: *Illustrated London News* May 13, 1893 ©2012 Gale

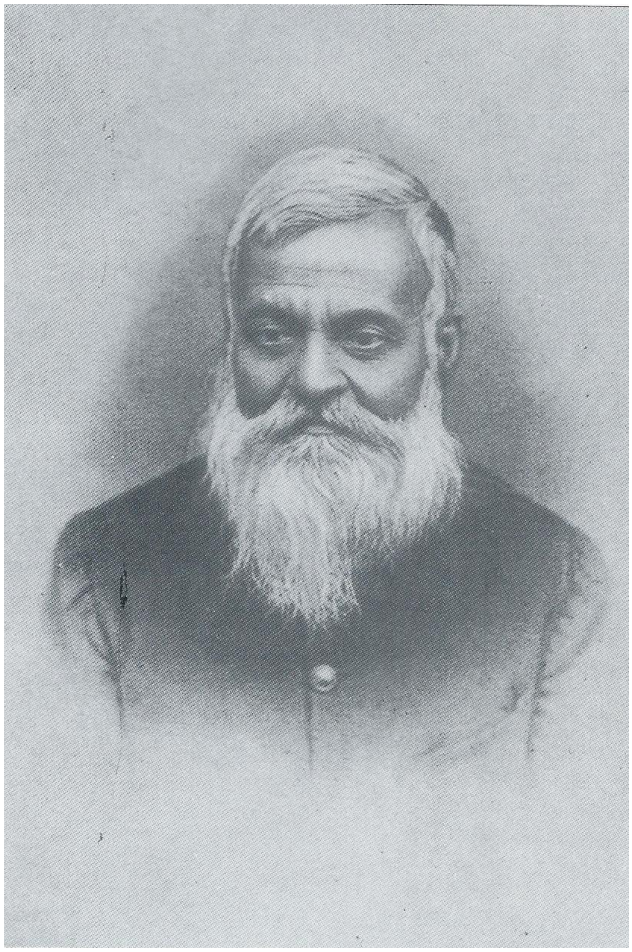


Figure 6.10 Trailokya Nath Mukharji (n.d.)

Source: Chakravarti 2004

Figure 6.11 Fibres in the Economic Court, Indian Museum, Kolkata

Image reproduced courtesy of the Indian Museum

Figure 6.12 Indian Museum, Kolkata

Image reproduced courtesy of the Indian Museum

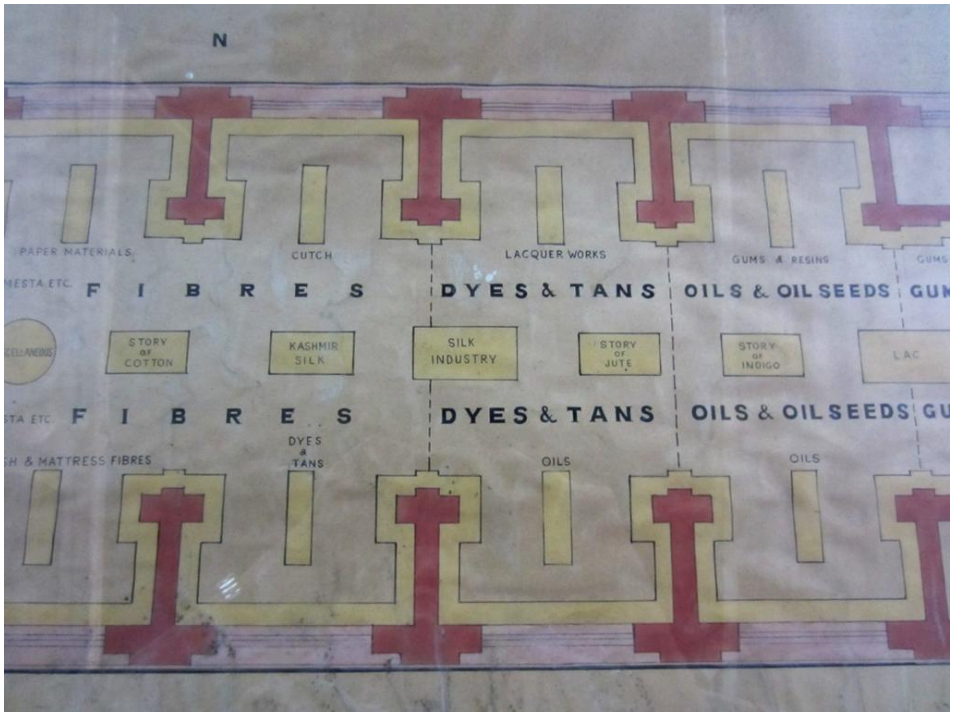


Figure 6.13 Plan of the Economic Court, Indian Museum, Kolkata

Image reproduced courtesy of the Indian Museum

Blackburn Museum	Box of vegetable products
Copenhagen, Botanic Garden	Box of woods from the Forest Department
Dundee Museum	Large swing-case containing collection of fibres
Edinburgh, Museum of Science and Art	426 specimens of vegetable products
Edinburgh, University	Collection of Indian drugs
Exeter, Albert Museum	Box of vegetable products
Glasgow, City Industrial Museum	Seven exhibition cases containing arranged collections of dyes, drugs, tea, coffee, cereals, cotton, &c.; carved black-wood sideboard; eight boxes containing 581 specimens of miscellaneous vegetable products
Hamburg, Handelsmuseum	Two boxes of vegetable products
Harvard University, Massachusetts, Arboretum	Six boxes and packages of Indian woods from Forest Department
Harvard University, Massachusett, Museum	Three boxes of woods from Forest Department and eight boxes vegetable products
London, Bethnal Green Museum (2 van-loads)	Animal products collection; 19 drawers illustrating Indian silk, 20 specimens of silk products
London, Bethnal Green Museum, Food Collection	446 specimens of Indian wheats, 2102 miscellaneous samples of vegetable food-products
London, British Museum, Botanical Department	121 large specimens of Indian woods, two boxes of woods from Forest Department, large bamboo stem
London, British Museum, Christy Collection	Twenty-one miscellaneous ethnographical objects
London, India Office	Royle Collection
London, Pharmaceutical Society	Ten boxes of pharmaceutical products
London, University College	Collection of Indian drugs
London, Parkes Museum of Hygiene	Four boxes of food-products
Mauritius, Bowen Museum	Six boxes of vegetable products
Melle-lez-Gand, Musee Commerciel-	Two boxes vegetable products
Industriel	
Newcastle-upon-Tyne Museum	Two framed specimens of cotton plants
Oxford Indian Institute	Collection of agricultural models, photographs illustrating cotton industry; sixteen boxes of miscellaneous vegetable products
Paris, Jardin des Plantes	Box of vegetable products
Strassburg, University	Collection of Indian drugs
Sydney, Technological Museum	Five boxes of vegetable products
Sydney, Economic Museum, Botanical Gardens	Box of vegetable products
Taunton Museum	Box of vegetable products
Washington, Department of Agriculture	Two boxes of woods from Forest Department

Figure 6.14 Principal recipients of the India Museum botanical dispersals 1879-81

Source: Hooker 1881, 58

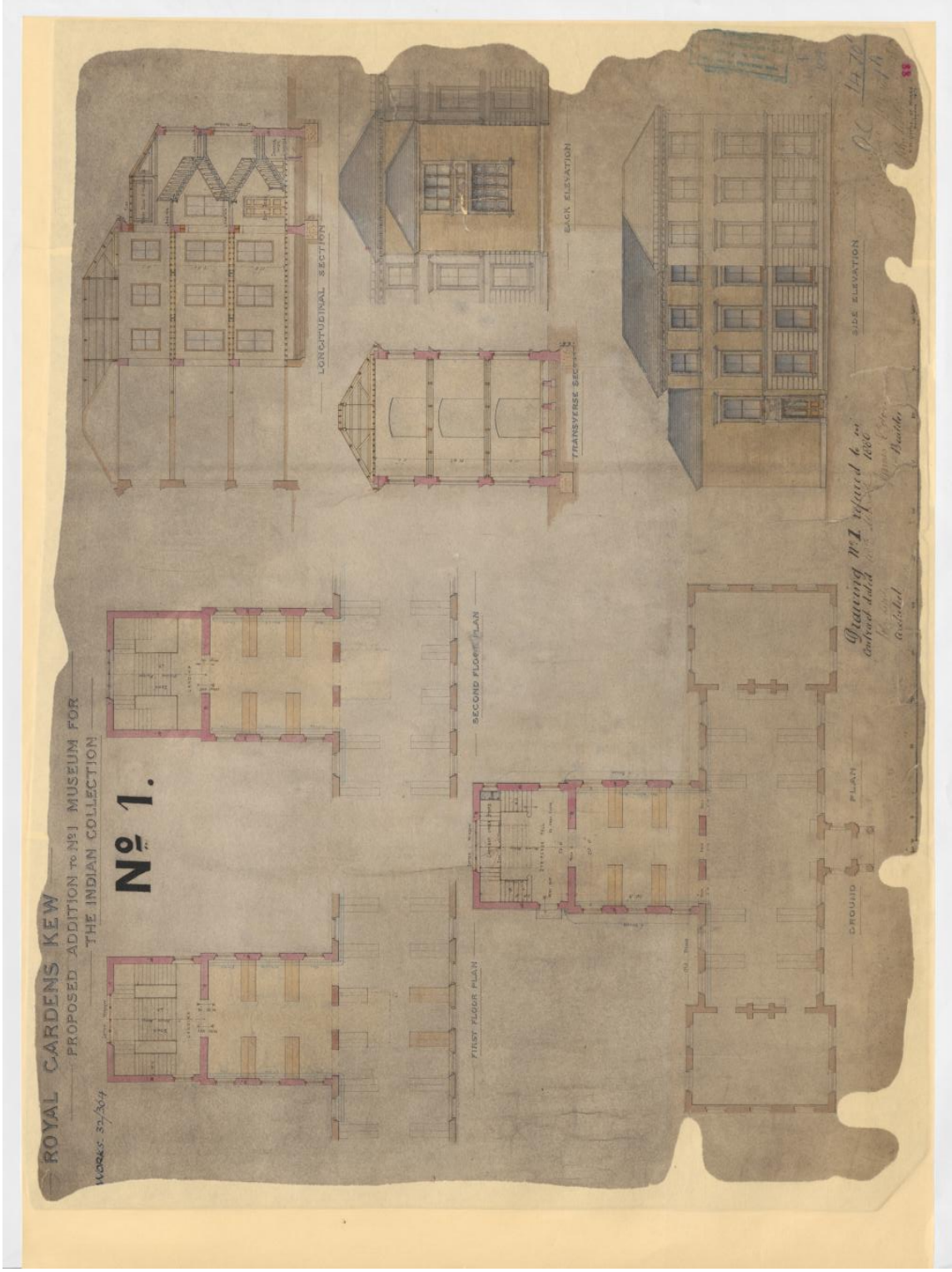


Figure 6.15 'Proposed addition to No. 1 Museum for the Indian Collection'

TNA WORK 32/664 Image reproduced courtesy of The National Archives

PART THREE

Objects

CHAPTER SEVEN

Mobility, Materiality, and Meaning: A Totem Pole from British Columbia

> By the courtesy of the Provincial Government of British Columbia, the Timber Museum (No. III) of the Royal Gardens has been enriched by a very interesting specimen of the decorative door posts or " Totem" poles used by the Indians on the Pacific coast. These posts are usually made of Red Cedar (*Thuja gigantea*) and are elaborately carved with figures of men and animals, and coloured…These posts possess considerable interest from an ethnographical point of view, and are likely to become very scarce or disappear altogether as the Indians adopt European habits.[1]
>
> RBGK 1898

In June 1898 the Kew *Bulletin of Miscellaneous Information* reported on the arrival of a significant new accession – 'a very interesting specimen of the decorative door posts or "Totem" poles used by the Indians on the Pacific coast' (RBGK 1898, 138) – which was promptly exhibited in the Timber Museum (Figure 7.1). The article indicated a number of the actors forming the network by which the pole had been mobilized from the village of Tanu in British Columbia to the Timber Museum at Kew: the Provincial Government of British Columbia; the collector – Charles Newcombe; the vehicle which enabled its sea journey – the barque *Seestem*; the owner from whom it was purchased – Mrs.

[1] *Thuja*: can also appear as *Thuya* in textual sources

Thomas Moody; and the source of the knowledge – anthropologist Franz Boas's report to the BAAS (Boas 1890, 1891) – by which Kew botanists legitimised their interest in such objects.

This chapter deploys the object biography methodology outlined in Chapter Three to trace the life of the Kew totem pole from its original cultural context in British Columbia to its current position in the British Museum (BM). It is, therefore, a cultural biography of a particular object. However, the chapter begins with a social history of a category of things – totem poles – accounting for their materiality, mobility and meaning in the late nineteenth century. In the first section, totem poles are considered as objects of the colonial gaze in the Northwest Coastal region of North America; and in a second section as mobile objects circulating around circuits of tourism, exhibition, science, and print. Here I argue that the spatial redistribution of totem poles from coastal peripheries to metropolitan centres resulted in a distorted representation of Native American culture, and that the 'scramble' for totem poles in the last quarter of the nineteenth century was as much inspired by their monumentality as by their increasing rarity – above all by their being subjected to the 'exhibitionary gaze'. All of which sets the scene for the third section, which reconstitutes the object biography of the Kew totem pole in multiple stages of acquisition, exhibition, and reception. Studying the conditions surrounding its acquisition helps clarify the process of negotiation which enabled its circulation and by which it acquired value. It also explains the subsequent processes of knowledge production, as do the analyses of how the pole has been represented in different museum contexts and in print. Studying the reception of the pole in the nineteenth century has been more speculative than conclusive, but a range of possible readings has been arrived at through an examination of the spatial implications of the two museum sites (Kew and the BM). The postscript – an account of a recent interpretation of the pole – repositions it as an art object with contemporary relevance to Haida

people. In sum, what is highlighted is the multiplicity of meaning and its cultural, spatial, and temporal contingency.

1. Totem poles and the 'scramble for Northwest Coast artefacts'

As the *Bulletin* article related, the Kew totem pole was collected in the village of Tánoo (now Tanu) in the Queen Charlotte Islands. The Queen Charlotte archipelago, named after the wife of George III, is situated off the coast of British Columbia (Figure 7.3). The Haida were the dominant group inhabiting the islands, which are now referred to by their traditional name of Haida Gwaii. A series of disease epidemics, most notably smallpox in the 1850s and 1860s, decimated their numbers; migration to manufactories caused further de-population of the islands, and by the close of the nineteenth century the remaining inhabitants had clustered around the villages of Masset and Skidegate, leaving a series of uninhabited villages behind (Kirk 1986), including Tanu which was unoccupied by 1885 (MacDonald 1983) (Figure 7.2). Before the arrival of European travellers, the Haida subsisted primarily by fishing, hunting and gathering. The islands were thickly forested as George Dorsey of Chicago's Field Museum reported on his visit in 1897:

> The forests were a revelation – bathed in an almost eternal mist which has been tempered by the mild Japan ocean currents, they are indescribably green. Giant cedars, firs, spruce, and hemlock fairly crowd each other and leave but scant room for the ferns and underbrush which cover every inch of ground (Dorsey 1898, 5).

The Giant or Western Red Cedar alluded to by Dorsey formed the basis of what Charles Newcombe later described as 'a very high development in the woodworking arts' in which 'the Haida, living on the Queen Charlotte group of Islands, were the best carvers' (Newcombe 1922, 194). They had evolved a

complex and distinctive iconography to signify their lineage and to decorate both everyday and ceremonial objects. Western Red Cedar has a number of features which precipitated widespread usage by the Haida: it can easily be split into large, wide planks for house walls and roofs; it is relatively rot-resistant, and it becomes flexible when heated with steam or hot water (Jonaitis 2006). It was used to construct canoes and paddles, and shredded cedar bark was woven into basketry, matting and clothing (Stewart 1984; McMillan 1988; Jonaitis 2006). Explorer-botanist Robert Brown dubbed it ' "the bamboo" of the North-western Indians' (Brown 1868a, 338). However, it was in the form of totem poles that Haida carving became best known in and beyond British Columbia in the second half of the nineteenth century and it was as a result of the widespread circulation of this cultural form that Kew director, William Thiselton-Dyer, and his assistant, Daniel Morris, decided to seek an example for the Kew Museum (RBGK 1898, 138-39).

Early sitings and writings: totem historiography

European fascination with totem poles dates to the first instances of encounter with the peoples of the Northwest Coast. In *Captain Cook's Third and Last Voyage* (Rickman 1781), 'two short squat posts' were described inside a house of the Nuu-chah-nulth people on Vancouver Island which was visited by Cook in 1778 (cited in Newcombe 1918, 102). These internal support posts were illustrated by the expedition's artist, John Webber (Figure 7.5) on Cook's own stipulation that the illustrations should be both 'entertaining to the generality of readers, as well as instructive to the sailor and scholar' (cited in Smith 1960, 109). By means of engravings, Webber's images were widely circulated in Europe, and constituted the medium by which readers gained knowledge of north Pacific peoples in the late eighteenth and early nineteenth century (Smith 1960).

In 1790 Captain Douglas of the *Iphigenia* wrote of 'the great wooden images of Tartanee' at the north-west end of the Charlottes (Meares 1790, 367), making this the first-known mention by a European of Haida poles. In 1792 there appeared the earliest-known image of a Haida pole, a rough sketch in a travel account by Boston seaman John Bartlett (Figure 7.6) (Bartlett 1925). This pole was a door-post in which the mouth of a carved figure formed the entrance to the dwelling. The accompanying narrative suggests Bartlett's admiration for the skill of the Haida carvers:

> The entrance was cut out of a large tree and carved all the way up and down. The door was made like a man's head and the passage into the house was between his teeth and was built before they knew the use of iron (Bartlett 1925, 306).

At this point it is worth emphasising that neither of these early examples – the Nuu-chah-nulth or the Haida pole – conforms to the tall, free-standing type of pole that came to connote Northwest Coast culture to Europeans in the following century.

Contact and entanglement

The publication of *Cook's Last Voyage* in 1781 marked the beginning of a period of intense maritime fur trade between the Northwest Coast Indians and Western Europeans (Jonaitis 2006). The Haida were not new to trade having long conducted exchanges for exogenous materials with neighbouring tribes, with Russians since the 1740s (Clifford 1997) and possibly with Spanish visitors earlier still, and many early traders were impressed by their commercial acumen (MacDonald 1983). In return for sea otter pelts they particularly sought iron, copper, fire-arms and alcohol. By 1810 the sea otter had been hunted to near extinction and fur traders turned their attention to land mammals. The Hudson's Bay Company (HBC) built a series of forts on the western mainland between 1805 and 1834 with the aim of capitalizing on

this ever-expanding trade. The last of these was situated at Fort Simpson, just across the Hecate Strait from the Queen Charlottes – 'an isolated node of trade surrounded by copious native trading cultures' (Clayton 1992, 30). Tsimshian, Tlingit, Niska and Haida people all traded with the HBC factors. This terrestrial trade brought wealth to many Indians and resulted in indigenous migration to the environs of the HBC forts. In 1849 a period marked by a degree of mutual respect between Indians and whites came to an end, when the HBC was given a royal charter for Vancouver Island and was charged with the appropriation of Indian land and with encouraging European settlement. In 1858 James Douglas, the governor of Vancouver, was also made governor of the newly-named Province of British Columbia and so began the process of 'civilising' the Indians in that region, whilst simultaneously consigning them to reserves. By 1901 the settlers in the Province of British Columbia outnumbered the indigenous people by more than seven to one.

Whether or not the Indians of the Northwest Coast produced decorated poles before the advent of European traders remains controversial. Present-day writers cite the testimony of Cook, Douglas and Bartlett, and assume that pre-contact poles were made using instruments of bone, horn or stone (Jonaitis 2006). However, Marius Barbeau famously disputed this while engaged in ethnological exploration in the region for the National Museum of Canada from 1914 to 1927. Having made 'a complete study' of the poles of the three Tsimshian nations (Barbeau 1929; 1930), he raised the possibility that the poles witnessed by eighteenth-century European visitors were 'not likely in themselves to represent a form of native art of the Stone Age in its purely aboriginal state, undisturbed by foreign influences' (Barbeau 1930, 269), that is, that those early poles were already the result of transculturation. However the sources do suggest that totem poles were rare in the eighteenth century whilst numbers expanded rapidly in the first decades of the nineteenth. Fur trading led to economic changes in coastal societies, and the increased wealth

of particular chiefs led in turn to growing competition in the form of ever more extravagant potlatches, and a corresponding efflorescence of artistic production. The early poles had taken the form of house-front poles and internal support posts and belonged to the age of communal lodges, but from the 1830s, as these were replaced by individual family dwellings, so the first detached columns appeared. According to Newcombe, the early Haida posts had been largely 'flat planks on which were displayed their hereditary crests', whereas, 'with the coming of the first whites to this Northwest Coast region and the introduction of iron tools, the Haida were able to carve their designs in the round, and the tall, round poles were made possible' (Newcombe 1922, 195). Among the Haida and other peoples, poles became signifiers of economic status where they had previously acted as signifiers of lineage.

In *Entangled Objects* (Thomas 1991) Nicholas Thomas argues for recognition of the relative autonomy of indigenous traders and their capacity for resistance and mutability in situations of trans-cultural encounter and exchange. Such situations created new contexts and meanings for traditional objects and also exerted influence over the production of new cultural artefacts, 'not necessarily…prior to white power but in relation to and sometimes in defiance of it' (Clifford 1991, 218). The advent of iron tools and commercial paints to coastal Canada provided the media for new types of formal expression, though these were often erroneously regarded as 'symbolic of the whole 10,000 years of Northwest Coast Indian culture' (Kirk 1986, 233). It is even possible to read the use of new colours and forms as a medium of resistance, fashioning an impersonal aesthetic 'made for trade'.[2] The spatial redistribution of totem poles which was to occur across North America and Europe was as much due to the preparedness of the Haida and other Indian nations to sell, as to the desire of white peoples to purchase.

[2] Pitt Rivers Museum website: http://www.prm.ox.ac.uk/new.html accessed 16 September 2012

By the 1880s, colonial rule had been imposed and the Haida had largely adopted European cultural practices. They complied with the potlatch ban of 1884, and abandoned most crest art, with the exception of special commissions and miniatures which continued to represent a significant commercial opportunity. Predictably, the period when the demand for totem poles on a worldwide scale was at its peak, was the very period when their production had ceased. The totem pole had shifted from familial property to commodity, then, by virtue of declining supply, been transformed into a 'historicised artefact' (Thomas 1991, 100).

The term 'totem pole' is everywhere contested whilst almost universally deployed. The carved figures represent animals and other natural phenomena and acted as crests, denoting the lineage and the inherited rights and privileges of the owner. Within the Haida social structure crests were clan- and family-specific, and were jealously guarded (MacDonald 1983). A more correct name, therefore, would be 'heraldic pole', a term Newcombe came to adopt (Newcombe 1909, 1). The term 'totem pole' appears to be a late nineteenth-century coinage, the first published usage appearing in Sheldon Jackson's *Alaska & Missions on North Pacific Coast* (1880). Concurrently, it came to connote a tall, rounded, free-standing, externally-situated pole – the type referred to by Jonaitis and others as the memorial pole. In fact the Haida produced three types of pole: the memorial pole, erected to commemorate a person or event; the mortuary pole, containing the remains of the deceased; and the house frontal pole of the type sent to Kew (Jonaitis 2006; MacDonald 1983). In this chapter I use the terms 'totem pole' or simply 'pole' to refer to the Kew example.

2. Totem poles in circulation

How did the idea and material form of the totem pole circulate in British culture during the nineteenth century? A range of popular texts was published over the course of the nineteenth century in which varying notions of American Indians and totem poles were circulated. Fiction writers portrayed native Americans as savages, typically noble or cruel (Williams 1999; Fiorentino 1999). In the missionary press they were depicted as capable of conversion whilst their traditional practices and material culture were simultaneously ridiculed (Clayton 1992). In such accounts, totem poles figure synecdochically for a past, extinguished way of life and for evangelising progress. Travel writing equally represented a source of mediated knowledge on the cultures of indigenous Americans to European audiences, particularly after the opening of the extended Canadian Pacific Railway line in 1885. Across a variety of popular titles, totem poles acted as *leitmotiv,* standing for a simultaneous attraction and repulsion towards Native American culture.

In anthropological journals, accounts of totem poles were diverse. Edward Burnett Tylor might be seen to represent one end of a spectrum, positing a degenerationist view of 'primitive' art in which stylised and more abstract forms represented a process of evolutionary regression (Tylor 1902, 2). Boas, on the other hand, countered degenerationist notions, emphasizing the ability of the Indian artist to represent animals whilst deploying 'his cleverness in designing lines of dissection and methods of distortion' (Boas 1897, 176). Suffice to say, the growth of the science of anthropology in the late nineteenth century, new developments in printing technology and capacity, and the proliferation of scientific institutions, led to greater knowledge of totem poles amongst the international scientific community.

Photographs of totem poles were taken on behalf of a number of constituencies, and like texts, were circulated in a range of media. On British Columbia's confederation into Canada in 1871 there followed a series of inspection tours and surveys by government officials accompanied by photographers. On George Dawson's 1878 expedition to the Queen Charlotte Islands for the Geological Survey of Canada, sixty-three photographs were 'taken on prepared dry plates' (Dawson 1880, 2). The accompanying report also contained a seventy-page appendix on the Haida and included illustrations and details of totem poles (Figure 7.7).

The dry plate process referred to by Dawson became available in the 1870s and led to an expansion in outdoor photography that had commercial as well as administrative applications. Professional photographers found a market amongst tourists and settlers, and through national agencies (Jonaitis 2006) (Figure 7.8). The totem pole was a common subject for postcards, which circulated internationally. Museums, too, commissioned photographs; on the Jesup North Pacific Expedition (1897–1902), thousands of photographs were taken (Figure 7.9). Photographs were important to establish context for objects, to act as condition reports on behalf of the collector, and to guarantee authenticity. Charles Newcombe adopted the practice of sending accompanying photographs with all the objects he collected for museums to assert his own authority as a collector.

In the wake of the 1880s Alaskan gold rush, 'excursionists' started to travel to the Northwest Coast by steamship from San Francisco and Seattle. The Haida had long recognised the market opportunity afforded by visitors to their islands. As early as the 1820s they were making miniature totem poles expressly for this new market and by the 1860s these had become the most popular of Haida artefacts amongst white consumers (Jonaitis 1999). These circulated widely, even entering into museum collections such as the Pitt

Rivers.[3] In addition, totem poles were transferred from indigenous villages to points on the tourist trail: landing stages, town centres, alongside railways; some were commissioned specifically for this purpose (Jonaitis 1999) (Figure 7.10).

Beyond tourist circuits, museums and world's fairs actively circulated knowledge of totem poles and their originating cultures. By the time of the 1867 Exposition Universelle in Paris, exhibitions had taken an ethnographic turn, and objects from colonised territories were juxtaposed with manufactures of the 'civilised' world. As Curtis Hinsley argues, raw materials and manufactures displayed alongside ethnographic objects, 'celebrated the ascension of civilised power over nature and primitives' (Hinsley 1991, 345). American fairs followed suit. 1876 saw the exhibit of Northwest Coast indigenous artwork – including totem poles – at the Philadelphia Centennial Exposition. These were collected expressly for the event by the Smithsonian Institution and after the fair were transferred to the Smithsonian's National Museum of Natural History in Washington D.C. (Cole 1985).

At the Chicago World's Columbian Exposition of 1893 there were 'live' ethnographic displays. Boas was given the task of organizing the 'Alaskan Village' and commissioned local collectors to procure not only totem poles and houses but also a group of Kwakwaka'wakw Indians to inhabit them (Jonaitis 1988) (Figure 7.11). In an exhibition celebrating four hundred years since the arrival of Columbus, and with the theme of 'progress', it is not difficult to envisage the role in which the Indians were cast, deliberately or otherwise.

[3] 'Pitt Rivers Collections Online' accessed 3 December 2010 at: http://databases.prm.ox.ac.uk/fmi/iwp/cgi?db=PittRiversCollectionsOnline&-loadframes

The description in *Magic City,* a souvenir publication, reflects this imposed role and contains a number of tropes observable in exhibitionary and other popular media:

> **The Alaskan Village**. On the edge of South Pond, near the Shoe and Leather Building, and the Cliff Dweller's Exhibit, was a village of Alaska Indians, composed of some twenty persons. These people, representing the Arctic sections of our domain, are peculiar in many ways; their social, domestic and religious customs being alike different from those of any other race or tribe. Prominent features of their villages, high and grotesquely carved tree trunks which, though not regarded as divinities, are believed by the Alaskans to have the power to preserve the village against the machinations of evil spirits. They pay no homage to these images, nor even bestow upon them any care, so that if one tumbles down it is suffered to remain prostrate, because the Alaskans believe that each Totem pole is the embodiment of a ruling and beneficent spirit, and to interfere with it in any way would arouse its anger (Buel 1894, 109).

The village formed a sharp contrast with the sobriety of the interior ethnographic collections organized by Frederic Ward Putnam, director of Harvard's Peabody Museum of American Archaeology and Ethnology and attracted more visitors (Cole 1985). As at Philadelphia, the exhibited objects were transferred to a museum collection on the closure of the fair, on this occasion to the Chicago Field Museum of Natural History. At the St. Louis Centennial Purchase Fair of 1904 Kwakwaka'wakw and Nuu-chah-nulth peoples posed and performed alongside totem poles and native houses (Figure 7.12) in an exhibit organised by Newcombe at the Field Museum's invitation (Cole 1985).

Museums and anthropologists, then, were engaged in the network of commercial fairs which supplied funding for the collection of Northwest Coast

artefacts between 1880 and 1920. By this time, professional collecting was driven by 'salvage anthropology', an attempt to record disappearing cultures in collections and publications. As Harlan Smith explained in 1917:

> Museums are warehouses of specimens...The storing of specimens saves them for future students, and sometimes from total loss. The totem poles, for instance, may be burned or neglected by the Indians with change in their beliefs and mode of life, unless stored in museums (Smith 1917, 97).

This rhetoric – of wresting Indian culture from the neglect perpetrated by its own people – provided the rationale for the 'scramble for Northwest Coast artefacts' (Cole 1985), the most prized of which was the totem pole (Jonaitis 1999). It coincided with an era of nation-building in Europe and America in which museums acted as potent symbols of national identity and imperial conquest (Duncan & Wallach 1980). During this period, anthropology was of use to the imperial project as a resource for governing colonized peoples more effectively (Coombes 1994). Anthropologists were valuable to governments because they evoked the 'authority, precision, and disinterest of science' (Thomas 1991, 138), and at the same time, anthropologists required the salaried positions that governments could offer (Coombes 1994).

The Smithsonian was one of the first large institutions to build up a Northwest Coast collection, and prompted the Canadian Government to sponsor collecting for its own institutions, which went on display in the Geological and Natural History Museum in Ottawa in 1881. The American Museum of Natural History in New York commissioned collecting in BC from 1882 (Cole 1985). The Chicago Field Museum was a constant force in the market for Indian artefacts and when curator George Dorsey visited the Queen Charlotte Islands in 1897, he met with Newcombe who was subsequently contracted to collect on the Museum's behalf from 1899 to 1906 (Cole 1985). In Europe, Berlin began collecting systematically in the early 1880s; collections included a large Haida

pole which was displayed at the opening of the Berlin Museum für Völkerkunde in 1886. The movement of such large objects from west to east was facilitated in 1885 by the extension of the Canadian Pacific Railway to Vancouver.

Other funding came from private benefactors. The Jesup North Pacific Expedition (1897-1902) organised by Boas for the American Museum of Natural History, was sponsored by industrialist Morris Jesup. The material outcome of the expedition, apart from the photographs, was an extensive collection of Northwest Coast art and a series of official publications, including *Contributions to the Ethnology of the Haida* by John R. Swanton (1905), which soon achieved classic status in Haida historiography. Newcombe cited him frequently, and more recently George MacDonald has leaned heavily on Swanton's text for his interpretation of crests (MacDonald 1983). Whilst visiting the Queen Charlotte Islands in 1900, Swanton and Newcombe met; it is possible their meeting was orchestrated by Henry Moody who had been Swanton's guide in 1898, and who, as discussed below, was to become Newcombe's local consultant (Swanton 1905, 5). On Swanton's recommendation, Newcombe was commissioned to collect for the expedition. It is perhaps an indication of how rare totem poles had become, and how intense the 'scramble', that at this time Newcombe, collecting for a number of institutions, adopted a standard rate of $1 per foot for house posts and $1.50 per foot for grave posts (Jonaitis 2006, 217).

What emerges from this account is that, prior to the opening of dedicated ethnographic museums such as the Berlin Museum in 1886 and the Pitt Rivers in 1887 ethnographic objects were often displayed in museums of natural history. The juxtaposition of ethnographic artefacts and natural history specimens has been understood to have a range of effects, some of which were discussed in Chapters Three and Four. Mieke Bal has described the cultural

apartheid she perceives in the spatial division of the collections between the American Museum of Natural History and the Metropolitan Museum of Art, situated on opposite sides of New York's Central Park (Bal 1992). The Museum of Natural History, she argues, is devoted, 'not to culture, but to nature' (1992, 558); it concerns itself with biology, geology and anthropology. Only Asian, African, Oceanic, and Native American peoples are represented there, 'precisely the peoples whose artistic accomplishments are represented only marginally in the Met' (1992, 559).[4] Their cultural products are framed as artefacts rather than art objects, unattributed to individual makers, and thus the vast majority of the world's population is represented outside of the temporal framework of art history. These sorts of display function, according to Tony Bennett, as 'instances of arrested development which Western nations had long ago surpassed' (Bennett 1995, 78). The objects, frequently from the subjugated territories of former empires, thus serve to broadcast 'the improving mission of the imperialist powers' (1995, 82). However, as we have seen, in the late nineteenth century anthropologists were divided in their attitudes to Native Americans, their material culture, and how it should be displayed.

Two of the most influential, albeit opposing approaches to ethnographic display were embodied by Pitt Rivers and Boas: serial display and ethnic display respectively. The latter sought to group objects according to their ethnic and geographical origin, or what Boas termed 'the tribal arrangement of collections', to demonstrate that 'civilization is not something absolute, but that it is relative, and that our ideas and conceptions are true only so far as our civilization goes' (Dall & Boas 1887, 589). As discussed in Chapter Four, the typological display – also known as 'deductive' (Dall & Boas 1887) or

[4] Currently there is a gallery devoted to the Art of Native North America in the 'Met' (Gallery 356), but it is situated in the section entitled 'Arts of Africa, Oceania, and the Americas', rather than in the American Wing. The latter consists of seventy-three galleries dedicated to fine and domestic art from the seventeenth century onwards.

Source: http://www.metmuseum.org/about-the-museum/museum-departments (accessed 21 November 2012).

'evolutionary' – ordered objects by type, in a sequence demonstrating a perceived evolution from 'natural' to more 'complex' designs. In this taxonomy objects were chosen for their representativeness, not rarity; they were akin to natural history specimens in a systematic collection. As an ordering principle, the serial approach had its roots in numismatics (Schlanger 2010), in which objects frequently and conveniently bore a date of manufacture. However, as others have argued (Coombes 1994; Bennett 1995, 2004), the ethnographic series ignored the dimension of chronology. It situated archaeological material alongside present-day ethnographic productions, whilst claiming an ability to read, through object design, the migrations of races; it used the artefacts of existing peoples to 'back-fill' the present (Bennett 1995, 196). The ethnographic serial display was thus inflected with a narrative of progress in which industrialized nations were implicitly positioned at the pinnacle of technological development.

As David Darling and Douglas Cole have argued, in the museum age of the late nineteenth and early twentieth century 'the totem pole became for ethnological exhibits what the tyrannosaurus was to a paleontological display' (Darling & Cole 1980, 29). Scale and form have contributed to totem poles' status as 'icons' (Jonaitis 1999, 121) within museums. The monumentality of totem poles has played a vital role in how they have been both translated and exhibited. Samuel Alberti relates the importance of 'the gigantic' to Victorian museum culture and the sense of awe and wonder that large-scale exhibits elicited from visitors. But contemporary accounts of museum visitors reveal that 'the awe-some aspect of the wondrous was closely tied to awe-ful responses such as disgust' – disgust at notions such as racial degeneration and monstrosity (Alberti 2007, 388-391). At the Pitt Rivers Museum, spatial constraints resulted in a rupture with the series displays in order to display the 1901 pole at the eastern end of the Museum (Gosden & Larson 2007), its prominence there implying special status (Figure 7.14). Similarly many poles were

positioned of necessity in atria, forecourts, and stairwells, where they have come to stand for the museum itself.

Totem poles were subject to what I term the 'exhibitionary gaze' – a way of viewing objects in terms of their potential for spectacle. In the nineteenth century the exhibitionary gaze directed the collecting activities of institutions and field collectors towards objects of high visual impact, regardless of whether or not those objects fitted the epistemological scope of a given museum. But it could also have unforeseen consequences. Just as the prevalence of funerary items at the BM before 1854 represented Egypt as 'a culture haunted by an obsession with death' (Moser 2006, 225), so the ubiquity of totem poles in the metropolitan centres of late nineteenth-century Europe and North America resulted in distorted misrepresentations of Native American culture, evoking impressions of a people principally concerned with the gigantic, the monstrous and the grotesque. The exhibitionary gaze could run counter to the epistemology of the science museum – one of representativeness – by introducing curiosities amongst the specimens. It could even result in the commissioning of special display pieces in preference to the diurnal and typical. And at the same time, the gaze affected indigenous production, privileging certain cultural forms over others, and encouraging formal experimentation.

3. 'A particularly fine specimen': the Kew totem pole

By the late 1890s, then, totem poles had been circulating in Europe and North America in a range of material forms and in Britain Native Americans had been represented at a number of exhibitions. In London 'Indian curiosities' from British Columbia and the 'Indian manufactures' from Vancouver appeared at the 1862 International Exhibition;[5] a model of Indians fishing in a

[5] 'Hemp and net, from the hemp nettle; rope and mantle, from the bark of yellow cypress; hats, a basket, whaling tackle, a harpoon, float and line, halibut fish-hooks' (IE 1862a)

canoe at the 1883 International Fisheries Exhibition (Anon. 1883, 557); and photographs of totem poles were shown at the 1886 Colonial and Indian Exhibition (Figure 7.13). There was a growing knowledge of totem poles amongst both the general public and anthropological circles. Knowledge of the actual material from which the poles were fashioned – Western Red Cedar – was, however, the subject of more specialist interest. This species – *Thuja plicata* D. Don (synonym: *Thuja gigantea*) was not imported in any quantity over the nineteenth century (Bowett 2012, 280) but in 1853 seeds of the species were introduced into England by the Veitch nursery firm (Maxwell 1922). Interest in them was initially horticultural. In 1868 a series of papers by Robert Brown were published in the *Transactions of the Botanical Society of Edinburgh*. Brown, a retired nurseryman, had toured the United States and Canada in 1834, accompanied by botanist James McNab.[6] The second of Brown's articles took as its subject the coniferous genus *Thuja* (Brown 1868b) and the third reported on 'the Vegetable Products, used by the North-West American Indians as Food and Medicine, in the Arts, and in Superstitious Rites' (Brown 1868c). Brown enumerated the features of Western Red Cedar timber: it split easily, was light, and yet was 'almost indestructible underground' (Brown 1868a, 338). He proposed its usage in railway sleepers, window-sashes, and doors, but his project was not one of importation, rather of transplantation: 'It is one of the most beautiful trees in North-west America, and ought to be extensively planted in England' (1868a, 338).

Thuja timber was the subject of numerous articles in publications such as the *Journal of the Royal Society* and *Gardeners' Chronicle* from the 1880s onwards and in this period nearly 2,000 acres at the Benmore estate in Argyll were planted with a variety of Canadian conifers – including *Thuja plicata* – with

[6] Boyd, Peter D. A. "McNab, James (1810–1878)." Peter D. A. Boyd *Oxford Dictionary of National Biography*. Online ed. Ed. Lawrence Goldman. Oxford: OUP, May 2009. 8 June 2012 <http://www.oxforddnb.com/view/article/99630>

considerable success (Maxwell 1922). In 1897 the *Gardeners' Chronicle* urged: 'it grows so well here in most situations, is so handsome, and makes timber so fast, that we can but highly recommend it, not only for ornamental purposes, but for economic use' (MTM 1897, 213). It was not solely the cost of transportation that lay behind proposals for transplantation. The parliamentary report on the forests of Canada published in 1885 had highlighted anxieties over the 'proximate exhaustion of forests' in the Dominion, despite Canadian assurances to the contrary.[7] In the same year a select committee was appointed to determine how British woodlands 'could be rendered more remunerative';[8] Thiselton-Dyer was one of the witnesses called.

By 1896, awareness of Native American material culture had increased in Britain, knowledge of Western Red Cedar was growing, and still Kew had no examples in the form of worked products. Therefore when Morris, as Assistant Director, wrote to the High Commission for Canada in London in 1896 with a new desideratum – 'a good specimen of the decorative door posts used by the natives of British Columbia' – he was certainly aware of totem poles via exhibitionary networks.[9] He also named two additional sources of knowledge: a recent visit to New York where he had seen the posts in the American Museum of Natural History collected by Boas, and Boas's report to the British Association in 1890 (Figure 7.15), a tracing from which he included in his letter (Figure 7.16).

[7] 1884-85 [C.4376] *Canada. Reports on the Forests of Canada. With précis by Dr. Lyons, M.P., of certain papers submitted therewith,* p.3

[8] 1884-85 (287) *Report from the Select Committee on Forestry; together with the Proceedings of the Committee, Minutes of Evidence, and Appendix,* p.ii

[9] Letter from Daniel Morris, Kew to J. G. Colmer CMG Secretary of the High Commission for Canada, London, February 12, 1896, headed 'British Columbia Decorative Native Posts'; RBGK Archives MR/615, f.259

It is worth here reflecting on the precise wording of Morris's request. He did not ask for a totem pole, but 'a good specimen' of a decorative door post.[10] The word 'specimen' is of the language of natural history collecting, and its use here reflects the mode of combining diverse elements into a single collection of economic botany by classifying all objects according to their botanical origin. Secondly Morris did not request a totem pole; the specificity of the term 'decorative door post' is indicative of one who has studied the field, and who appreciates that door posts were the historical antecedents to the more recent totem poles. Morris was ideally seeking the very item in Boas's report, an object with proven authenticity and provenance.[11] This, perhaps, in deliberate contrast to the house posts accessioned by the Pitt Rivers Museum in 1887, the provenance of which was somewhat dubious, having been obtained by the Superintendent of the Government Dock-Yard at Esquimalt Harbour from the Hudson's Bay Company at Port Simpson (Tylor 1899a, 136). Furthermore Morris's request makes explicit reference to Boas's report, thus aligning Kew with the science of anthropology rather than with the world's fair or the popular press. Such acts of alignment – of identifying 'relational' knowledges (Whitehead 2009, 73) – formed part of the process of constructing economic botany as a scientific discipline in the Kew Museum.

The pole which Kew eventually acquired was collected by Charles Frederick Newcombe MD, a medical graduate of Aberdeen University who had emigrated to Victoria, BC in 1889. 1891 was a turning point for Newcombe; his wife died and he returned to England where he took courses in geology at the University of London and studied the natural history collections at the BM, by this point housed in their new building in South Kensington. Whilst in London he

[10] RBGK Archives MR/615, f.259

[11] RBGK Archives MR/615, f.259: 'This particular specimen is well-known to Mr I. W. Powell of the Indian Commission at Victoria and probably no difficulty would be experienced by him in obtaining possession of it'

purchased photographic equipment, and on his return to Victoria he embarked on a new career as a collector. As a keen amateur botanist – in the 1870s botany was still a constituent course on a Scottish medical degree – he had long been interested in the flora of the Canadian Northwest Coast region, but now he began to venture further afield, first visiting the Queen Charlotte Islands in 1895. In the process he deepened his knowledge of the Haida people and began collecting ethnographic artefacts. Newcombe tailored his collecting practice to the physical and human geography of the region and to the requirements of the market – anthropologists employed by museums and exhibitions. He had a boat specially made for his fieldwork which was easy to row and to sail, could be transported by steamer, and afforded him access to the remotest areas of the coast (Neary 2000). As well as keeping photographic records of objects in situ, he developed a system of recording detailed field notes. He built up stable relationships with Haida residents with whom he conversed via local interpreters and guides. Anthropologist Pliny E. Goddard, who travelled the BC coast with him in 1922, observed how 'nearly everyone knew him or knew of him and greeted him as an old friend' (Goddard 1925, 352).

Newcombe was an instinctive mobiliser of networks. As a collector with a scientific approach to recording and classifying, he was soon engaged in extensive correspondence with scientists across North America including George Dawson of the Canada Geological Survey, and W. H. Dall and G. Brown Goode of the Smithsonian Institution, stabilizing these connections with personal visits when possible (Cole 1985). He was later to do the same with Kew. There was also a spatial dimension to his networking: he met many researchers from large institutions in the field where word of visitors reached him rapidly across his network of indigenous consultants. One such consultant was Henry Moody, who accompanied him on his 1897 trip.

Moody was from the principal family of the village of Skedans on Haida Gwaii. His father Job had been a chief and Henry acceded to the title in the early 1900s.[12] Henry Moody offered the three attributes required in a local collaborator: 'access, literacy, and reliability' (Cole 1985, 157). He not only possessed the linguistic and geographic knowledge essential to Newcombe's work, but as a chief he was of high status and therefore had influence amongst his people. The photograph taken by Newcombe's son, Arthur, at Tanu in 1923, reveals much about the relationship between the two men (Figure 7.4). They appear relaxed in each other's company, both smoking cigarettes, and there is no obvious sense of hierarchy. Moody epitomises James Clifford's concept of 'the traveller' (Clifford 1997): neither totally typical of his nation, nor immobilized within it, he traversed territories and cultures in the course of 'informing' European collectors. The working relationship between Moody and Newcombe had a financial foundation; Newcombe paid for all the poles and other artefacts he collected (Low 1982), and it is assumed that Moody took commission from the agreed price. The price for the Kew pole was agreed directly with Moody's kinsman Thomas at twenty-five dollars, with an additional six dollars for towage to Skidegate in time for the September steamer. As Newcombe noted in his notebook: 'This makes T. M. responsible for the safe delivery in sound order'. The alliance between Newcombe and Moody was long-lasting; the last collecting trip they undertook together was in 1923, just a year before Newcombe's death (Cole 1985). The 1897 trip, during which the Kew pole was collected, initiated their partnership as ethnographic collectors, and on the same trip they also carried commissions for the Bremen Museum, the American Museum of Natural History, and the Canadian Geological Survey.

[12] Newcombe's notes transcribe a letter sent 5th April 1905 in which Moody refers to himself as 'Henry Moody, The Raven Chief of Skedans'. BC Archives, Newcombe Family Papers, MSS 1077, Volume 55, Folder 8

In March 1898 a letter to Thiselton-Dyer from Arthur Campbell Reddie, BC Deputy Provincial Secretary, announcing the shipment of the pole, cited Newcombe directly concerning the pole's previous history: 'It represents the crest of the late owner's family, an eagle over another animal, species unknown'.[13] That Newcombe should have designated the lower animal as unknown is curious, given that in his field notes, he clearly labels it as a whale (Figure 7.17). Furthermore, the *Bulletin* article published in June 1898 interpreted the carved creatures as 'a bear, an eagle, and other animals' (RBGK 1898, 138). The origin of Kew's reading of the pole is unclear, although it may have been through dialogue with Tylor at Oxford. The Pitt Rivers Museum had acquired two house-posts ten years earlier (Tylor 1899b) and Tylor corresponded with Thiselton-Dyer between 1883 and 1901, and exchanged publications, specimens and ethnographic objects. They also associated at BAAS meetings and other scientific gatherings.[14] That a shared area of interest was North American ethnography can be deduced from a letter in which Tylor thanked the Kew director for a Colonial Office paper on the status of North American Indians.[15]

Networks

Kew Gardens and the Colonial Office were actors in a well-established network of economic botany extending across the British colonies and dominions, in which both agencies were mutual beneficiaries. Beyond the Colonial Office, however, Kew had exercised little agency vis-à-vis Canadian government departments at federal or provincial level. What enabled the formation of this new network was the agency of objects: the potential of totem poles as

[13] RBGK Archives, MR/615 Canada Cultural Products 1862-1909, f.270

[14] RBGK Archives: Letter to Thiselton-Dyer from Tylor, DC 104, f.41; letter to Joseph Hooker from Tylor, Letters to J D Hooker STR-WAL c. 1840s-1900s, ff.197-98

[15] RBGK Archives, DC 112 English Letters 1901-1905, f.1739

spectacular museum exhibits and the perceived imminence of their disappearance from the Canadian landscape.

Morris's 1896 letter was sent directly to the High Commission for Canada in London and it introduced three actors new to Kew: the door post itself, Israel Powell, and Franz Boas. From 1888 Boas had conducted fieldwork in the American West with funding from the North-Western Tribes Committee of the BAAS and the Canadian government, and Morris's letter suggests that he had been in direct communication with him. Dr. Israel Powell was introduced into the germinal network by Boas. He was a respected Victoria physician who in 1872 had been appointed by the Dominion Government in Ottawa as Superintendent of Indian Affairs in British Columbia and was 'well known and generally sympathized with in Ottawa' (Harris 2002, 86). He was already part of a collecting network which encompassed governments and museums, and had previously been commissioned by the Canadian Government to supervise collecting for the Canadian Geological Survey, as well as by the American Museum of Natural History (Cole 1985).

Morris's letter was forwarded to Ottawa, to the Department of the Secretary of State and thence to the Lieutenant Governor of British Columbia, Edward Dewdney, who confirmed that Powell would be able to procure a door-post for about one hundred Canadian dollars.[16] It becomes clear that Powell had called on his own local network of collectors in a letter from Joseph Pope, Under Secretary of State, informing the Colonial Office that 'a resident well qualified for the purpose has been commissioned to obtain a worthy specimen of the object desired', the first allusion to Newcombe.[17] In March 1898 Campbell

[16] Letter from E. Dewdney, Lieutenant-Governor at Government House Victoria , June 8, 1896; RBGK Archives MR/615, f.263

[17] Letter from Joseph Pope, Under Secretary of State, Dept. of Sec. of State, Ottawa, to Kew, dated April 20, 1897; RBGK Archives MR/615, f.267

Reddie was able to write to Kew, confirming the despatch of the door-post and sending two photographs taken by Newcombe of which only one has been traced (Figure 7.18). A diagram of the chain of communication can be seen at Figure 7.19.

Knowledge production

Knowledge is produced in and through material and embodied forms: texts, demonstrations, skills, and in the museum, the particularly spatial knowledge produced by displays of objects. Contextual knowledge produced around the totem pole began with the oral testimony of Newcombe's consultants. This socio-geographic knowledge – where poles were situated and what they signified – was rendered mobile and combinable through the multi-lingual skills embodied in these indigenous actors, and stabilised when Newcombe translated their reports into written form, first in his notebooks, then in correspondence and published accounts.

After his first professional collecting trip to Haida Gwaii in 1897, Newcombe was keen to maintain the network in which he, Kew, and Haida people and objects were juxtaposed, and continued to collect indigenous accounts of the Kew totem pole in the years following its shipment to Kew. On returning to Victoria after the 1897 trip he was asked to arrange and catalogue the ethnological collection at the Provincial Museum and whilst there he interviewed a number of Haida passing through the city on their way to the salmon fisheries.[18] C. Jefferson confirmed that the two animals represented on the pole were the eagle and baleen whale, crests from the male line of the family, and this was corroborated by the oral history of another informant, W. Woods: 'The crests seen are those of the man and are the eagle above with the

[18] Letter from Newcombe to Thiselton-Dyer, October 1, 1898; RBGK Archives MR/615, f.278

true whale at the bottom'.[19] Unfortunately there is no evidence that this knowledge circulated beyond Newcombe's notebooks, and consequently when the pole was transferred to the BM in 1958, the accompanying description still read, 'an eagle over another species, unknown'.[20] Another missing inscription in the accumulated knowledge produced around the pole is the identity of its carver. It is possible that this absence represents the museum community's view of totem poles as artefacts rather than art objects at the time of its acquisition, and there is no evidence in Newcombe's notes that the question was asked.

The pole was accessioned into the museum collection at Kew on 30th April 1898 along with an extract from Campbell Reddie's letter.[21] It was the practice at Kew to use any accompanying data for the object label or in published descriptions, and although the label has not survived, it is highly likely that the text would have originated from this source. This was certainly the case in the third edition of the Timber Museum guide of 1927, the first guide in which the totem pole was mentioned:

> **No. 147.** – TOTEM POLE from the village of TANOO, MORESBY, QUEEN CHARLOTTE ISLANDS, BRITISH COLUMBIA. It is made of wood of RED CEDAR, *Thuya plicata* D. Don, and brought here in *1898* when it was about 20 years old. Its position with regard to the frame of the house is as follows: The ridge pole of the house rested between the ears of the Totem, which helped to keep it in place. The carving represents the crest of the late owner's family, an eagle over an unknown animal (RBKG 1927, 31).

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[19] BC Archives, Newcombe Family Papers, MSS 1077, Vol. 55, Folder 8, Subject Files, Series B: Ethnological, Tanu

[20] Letter from George Taylor, Kew director to Adrian Digby, BM, dated February 28,1958; British Museum (BM) Ethnography Department, BM Eth. Doc. 1984

[21] RBGK EBC, Museum Entry Book 1896-1924, EBN 68.1898

It is interesting that the term 'totem pole' was chosen over 'door post' and this reflects the nomenclature used by Campbell Reddie. The data given is firstly geographical, reflecting the display principle originally adopted in the Timber Museum. Botanical knowledge follows geographical, and then comes information on the pole's age, its original site, and structural function. This is significant because it speaks to the key audience for the Museum, 'manufacturers and others engaged in trade' (RBGK 1927, 4). It tells of Western Red Cedar wood's durability, its tensile strength, and its suitability for construction. Finally comes ethnographic knowledge in the interpretation of the carvings. The interpretation given in the 1898 *Bulletin* – 'a bear, an eagle, and other animals' (RBGK 1898, 138) – has disappeared, and been replaced by the description given in the letter.

As well as gymnosperms and timbers, Museum 3 was a repository for objects simply too large for Museums 1 and 2. Stephanie Moser has demonstrated how, through the prominent display of large individual items of 'an unusual nature' in its Egyptian galleries, the BM 'unconsciously defined itself as a cabinet of curiosities' (Moser 2006, 49). In 1886 similar items occupied the central space in the Timber Museum and included 'models in cork of a ship, of the town of Fribourg in Switzerland, and of the Queen's Cottage, Kew' (RBGK 1886, 69). The spatial constraints of the other museum buildings, and the re-distribution of large objects, particularly models, into the centre of the Timber Museum, created a kaleidoscopic array of curiosities, botanical specimens, and prepared timber samples (Figure 7.20), and must have thrown into relief a range of potential readings of the totem pole for late Victorian audiences.

The location of the totem pole in the early nineteenth century can be seen at Figure 7.1 and in plan form at Figure 6.4. It was situated at the west end of the Orangery building (RBGK 1960), amidst a number of large tree specimens, none of which was *Thuja plicata*. With no geographic or generic commonality,

these were most probably grouped according to their size. Unfortunately the pole was somewhat dwarfed by the height of adjacent exhibits, and so its scale and technical achievement were only partially communicated. When juxtaposed with natural history specimens in this way, and when not forming part of an illustrative series showing the conversion of Red Cedar into a finished item, a reading of the display as a blurring of nature and culture is certainly feasible. Furthermore, with no visual cue that it was formerly part of a domestic structure, the Haida Indians associated with the pole may have appeared to visitors to inhabit a landscape as timeless as the forests; they were positioned on the same plane as the flora and fauna, and may therefore have appeared implicitly as worthy objects of colonization and improvement.

Life after Kew

The totem pole remained in the Orangery undisturbed until 1958 when the Ashby Report recommended the closure of Museums 2 and 3, finding them 'choked with worthless bric-a-brac unloaded upon them by State dignitaries, Government officials, and travellers'.[22] The Kew reaction was immediate. The visitor books of that year record the visit of Adrian Digby, Keeper of Ethnography at the BM, 'to see Totem Pole & other specimens No. 3 Museum', followed by Mr. Langton, also of the BM, 'to measure totem pole'.[23] The pole was accessioned into the BM collections in 1958 (Figure 7.21), along with Newcombe's photographs and an accompanying letter from George Taylor, then director of Kew. The entry in the accession register reads thus:

> 1. Totem Pole (65.1898) Western Red Cedar, *Thuja plicata*, D. Don
> From Queen Charlotte Islands
>
> "It formed the front and only entrance to the house of Mrs. Thomas Moody. It is made of Cedar (T. gigantea) and is about 20 years old.

[22] RBGK Archives, Report of a Visiting Group to the Royal Botanic Gardens, Kew (Chairman: Sir Eric Ashby) [in March 1957], MAFF 1958, ¶19

[23] RBGK Archives, QX 93-0002, Box 4, Visitors' Book Museums 1955-1979

> Its position with regard to the frame of the house is shown in photo No. 1. Between the eaves of the totem projected the end of the ridge pole which rested on the top of the totem, helping to keep it in place. The pole was furthermore set about 4 ft. in the ground but had very slight support from the building. It represents the crest of the late owner's family – an eagle over another animal species unknown."[24]

Despite the fact that Kew had produced an alternative interpretation of the iconography in the 1898 *Bulletin* article (RBGK 1898, 138), this knowledge had not been recorded in the Kew Museum accession register – in Latourian terms it had not been tied together with other inscriptions, and so was not passed on with the pole (Latour 1987, 215-57). Newcombe, as the collector, was omitted from the entry, information that was temporarily lost to the object's history. In the transfer to the BM, a process of translation occurred; in the register it was now described as 'a wooden carved totemic doorway, with traces of red and blue colouring, representing an eagle (or Thunderbird), and the Raven'.[25] The BM had brought its own accumulated knowledge to bear on the interpretation of the iconography – a knowledge embodied in its collection of Native American material culture – and produced a new reading. The botanical denomination had disappeared; the object had been translated from raw material to ethnographic artefact.

The 'totemic doorway' was erected in the Ethnography Gallery where it remained throughout the 1960s. From 1971-1993 it was in storage, and from 1993-95 on display at the Museum of Mankind in Burlington Gardens, where it featured in the *Treasures of the Americas* exhibition. From 1995-2001 it was again in store. It appeared in its present location in the *Living and Dying* gallery when the latter opened in 2003.[26] This is a thematic display which

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[24] Letter from George Taylor, Kew to Adrian Digby, BM, dated February 28, 1958; BM Ethnography Department, BM Eth.Doc. 1984

[25] BM: Register of Antiquities. Ethnographical. Vol. 15. America 2. AM.16 1957-AM8. 1968

[26] Robert Storrie, BM 2010, *pers. comm*. 2 November 2010

considers 'different approaches to averting illness, danger and trouble, and investigate[s] people's reliance on relationships – with each other, the animal kingdom, spiritual powers, spirits and the world around us'.[27] The pole's presence there is once again ambiguous, apparently functioning as an object of worship or source of spiritual power. Unfortunately the text panel and photograph have been absent for some considerable time now, so it relies on its position within the gallery – marking the entrance to the adjacent North America gallery – to generate knowledge (Figure 7.22). Against the eastern wall, it is not overshadowed by taller exhibits, and its scale certainly speaks of its cultural importance. There is something in the way visitors sometimes stop to gaze on its monumentality which harks back to the early days of 'totem-mania'.

4. Conclusion: constructing networks, creating meaning

How had Kew succeeded in forming a network to acquire the totem pole? In the first instance, Donald Smith had been recently appointed in 1896 as Canadian High Commissioner in London, opening up new transactional possibilities between Britain and Canada. Smith had particular interests in British Columbia and as director of the Canadian Pacific Railway had driven in 'the last spike' in 1885, connecting the Province to the rest of the railroad network. Smith communicated with the Secretary of State in Ottawa, and this provided a direct line of communication into British Columbia in the form of the Lieutenant-Governor, Edgar Dewdney. Dewdney conferred with the Federal Indian Superintendent for Coastal British Columbia, who as a collector himself had a stable network of consultants in the Province, and through this process Newcombe was commissioned. Morris had succeeded in stabilising a composite collection of people and objects sufficiently to render the totem pole mobile. However he had not done this alone. He had identified a number of actors –

[27] BM Website, 'Living and Dying (Room 24)'; accessed 8 June 2012 at: http://www.britishmuseum.org/explore/galleries/themes/room_24_living_and_dying.aspx

Donald Smith, Franz Boas, Israel Powell – who in turn had turned to supporting networks – what might be termed 'infra-networks' – of localised collecting, and of federal and provincial government, to overcome spatial and institutional resistance and mobilise the pole.

How did the pole function within the space of the Timber Museum? From its immediate juxtaposition with other natural history specimens, its ability to function as an 'industrial use' of Western Red Cedar timber appears compromised. In the absence of the label, the extent to which the features of the timber – its strength and resistance, as well as its suitability for British sylviculture – were transmitted to the viewing public can only be guessed at. From the wider perspective of the entire Museum, it may have been encountered as another 'large article', another remainder 'unloaded' by a foreign government, a curiosity among the specimens. Part of the answer lies in the circumstances surrounding the pole's acquisition. Morris's 1896 letter declared his interest in totem poles: 'Such posts possess considerable interest and they are likely to become very scarce as the Indians gradually adopt European habits'.[28] Kew was caught up in the 'totem-mania' which pervaded museum collecting in the last quarter of the nineteenth century. The monumentality of these objects excited public attention and they came to connote 'world' museums in America and Europe. At the same time, the Haida's migration from their traditional villages to colonial towns, and their simultaneous abandonment of traditional art production, imbued the collecting of totem poles with a sense of urgency, driven by a desire to 'salvage'. Morris and Thiselton-Dyer were as much motivated by a desire to capture and archive 'lost' skills and practices and to acquire an iconic object for Museum No. 3, as to illustrate the industrial uses of *Thuja gigantea*.

[28] Letter from Daniel Morris to J. G. Colmer CMG Secretary of the High Commission for Canada, London, dated February 12, 1896; RBGK Archives MR/615, f.259

5. Postscript

In May 2011, with Laura Peers of the Pitt Rivers Museum acting as intermediary, a present-day Haida carver of renown, Gwaai Edenshaw, re-appraised the Kew totem pole. Edenshaw describes it as 'baroque in its need to stuff design into every space available' and believes that the artist may have borrowed conventions from Haida head-dress design and hat painting.[29] The bird at the top has hitherto been interpreted as an eagle, but Edenshaw sees distinct similarities to the flicker – a species of woodpecker – in the open presentation of its wings revealing the coloured undersides, the detail upon the wings themselves, and the spotty belly.[30] He notes too, peculiarities of carving, such as the bird's even-weighted form-line in its pectoral shoulder, and the absence of a bridge on its nose, which lead him to speculate that the artist may have been from Kung, in the northernmost part of Haida Gwaii.[31]

Under Edenshaw's gaze, the object is translated from an ethnographic type into an art object – the work of a culturally- and geographically-situated artist, and one whose individuality is shown in particular aspects of the design. Its history moves from where it currently resides in the BM as part of the 'social history of things' to a single object with a unique history, a 'cultural biography' (Appadurai 1986). It is imbued with contemporary relevance, in part as a result of the resurgence of totem pole carving among the Haida since the 1960s, and in part because its iconography continues to speak to Haida people today. Edenshaw's reading can be seen as a new phase in the pole's 'consumption' and brings to mind Stephanie Moser's words on object histories, in which objects' 'original creation and function constitut[e] only one chapter in a trajectory of

[29] Barbeau likewise claimed that the carved motifs on totem poles came from ceremonial head-dresses (Barbeau 1950, 5).

[30] The use of woodpecker motifs is corroborated by Barbeau: '[Emblems] less frequently seen appear to be more recent: for instance ... *the woodpecker*' (Barbeau 1930, 260) (emphasis added).

[31] Gwaai Edenshaw, *pers. comm*., forwarded by Laura Peers 12 May 2011

existence that includes subsequent reuse, discovery, presentation, and interpretation' (Moser 2006, 6).

Figure 7.1 Kew Timber Museum (Museum No. 3) c.1900

Photograph by E. J. Wallis; KPI W-134 ©RBG, Kew

Figure 7.2 Tanu 1878

Photograph by George Dawson

© Burke Museum of Natural History and Culture

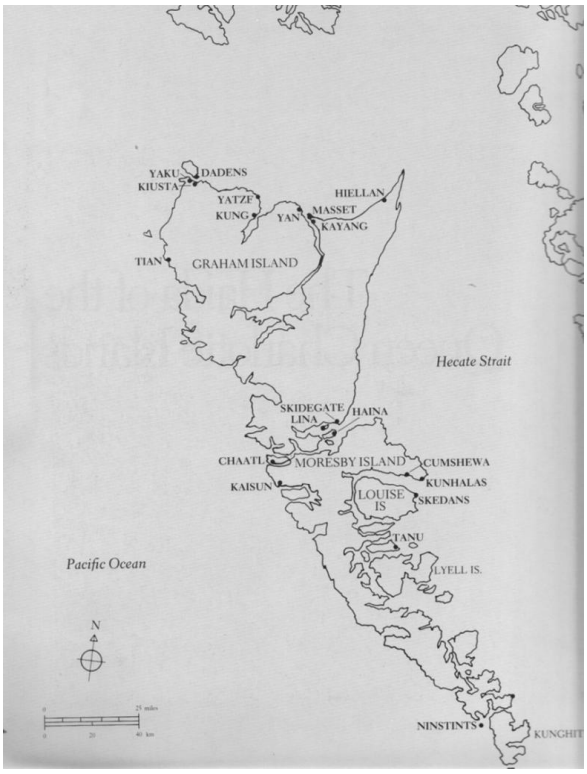


Figure 7.3 Map of Haida Gwaii

Figure 7.4 Charles Newcombe with Henry Moody 1923

Photograph by Arthur H. Newcombe

Image PN 5429 (AA-00578) courtesy of Royal BC Museum

Figure 7.5 John Webber *Interior of Habitation at Nootka Sound April 1778*

Figure 7.6 John Bartlett *Haida Gwaii. Haida House, Dadens* 1791

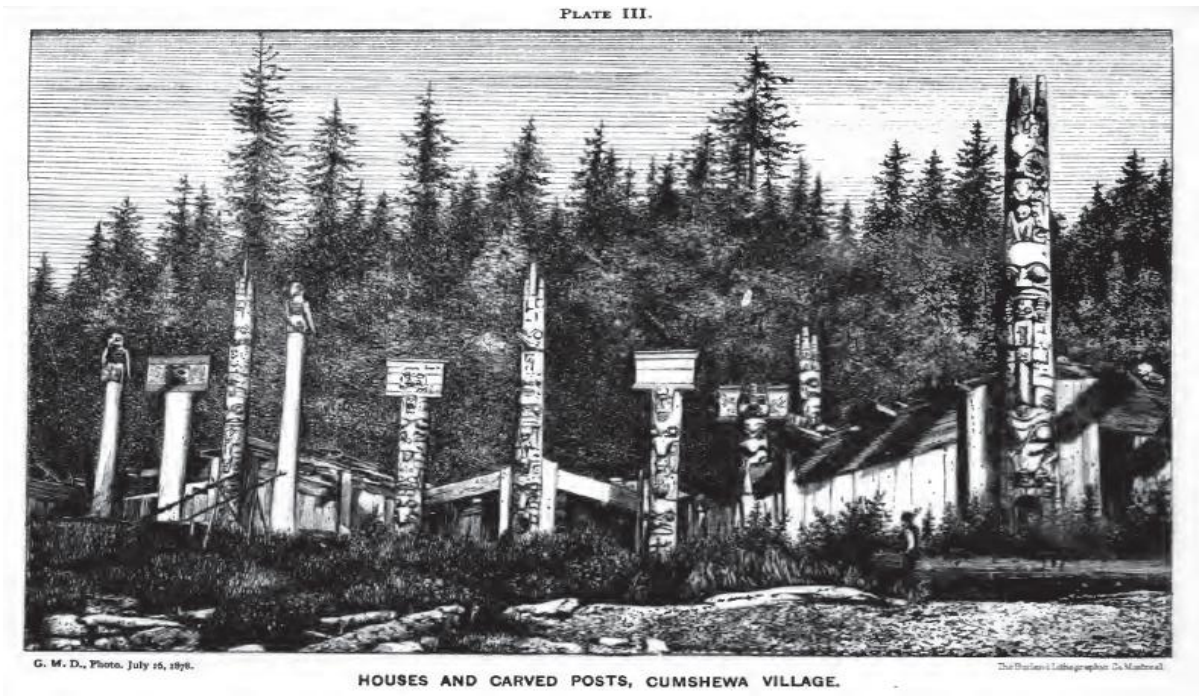


Figure 7.7 *'Houses and Carved Posts, Cumshewa Village.'*

Source: Dawson 1880

Figure 7.8 View of totem poles, Masset, B.C. c.1890

Courtesy Robert W. Reford/Library and Archives Canada/C-060823

Figure 7.9 Jesup North Pacific Expedition in Alaska c.1897-1902

Photograph copied by Thane Bierwert; negative no: 296253

Courtesy of the American Museum of Natural History

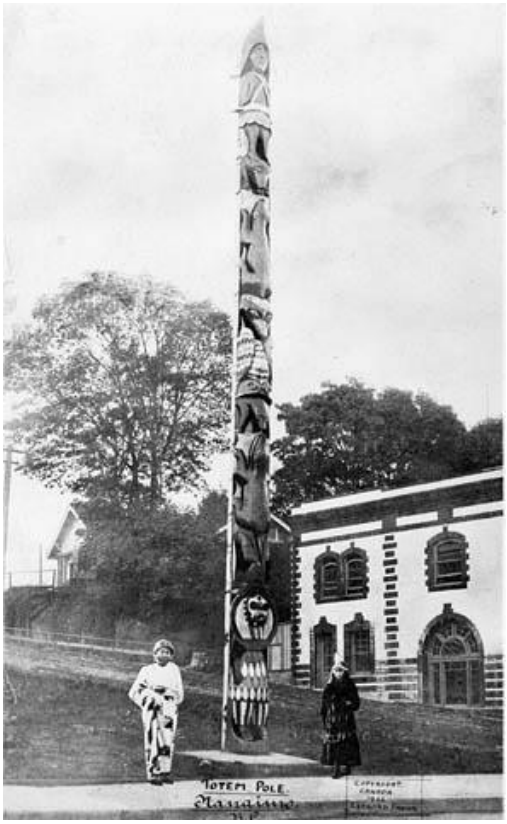


Figure 7.10 Postcard of totem pole, Nanaimo, B.C. 1922

Courtesy of Patent and Copyright Office Canada/Library and Archives Canada/PA-030815

Figure 7.11 Alaskan Village, World's Columbian Exposition, Chicago 1893

Source: Buel 1894

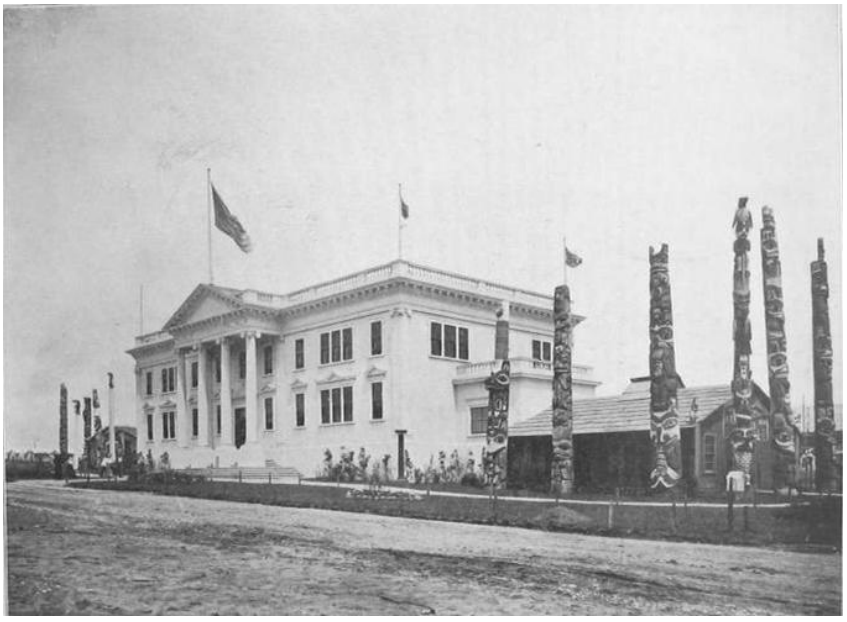


Figure 7.12 Alaskan Building, Indian cabin and totems, St. Louis Centennial Purchase Fair 1904

Source: St. Louis 1904

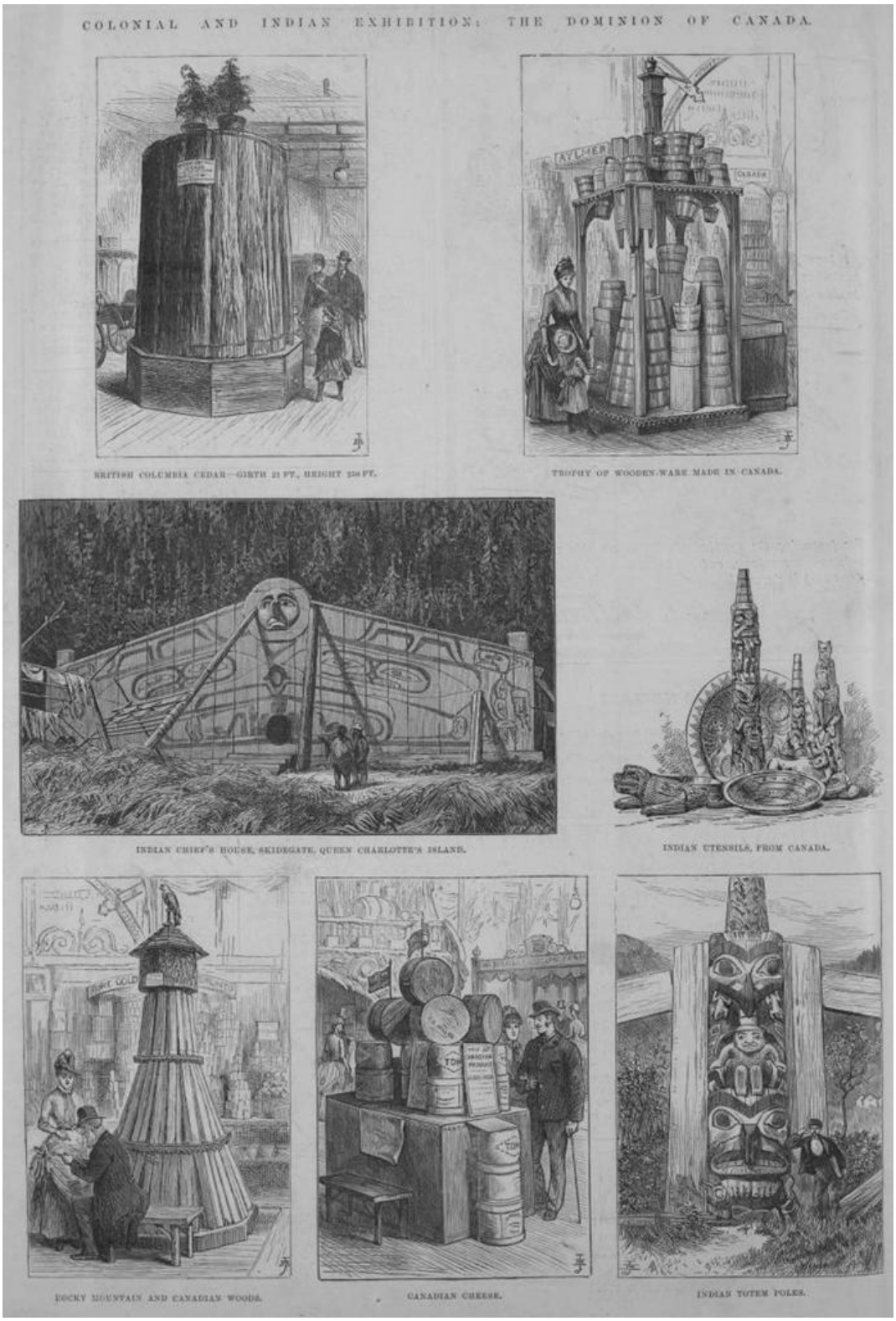


Figure 7.13 'Colonial and Indian Exhibition: The Dominion of Canada' 1886

Source: *Illustrated London News* 14 August 1886 ©2012 Gale

Figure 7.14 'The totem-post as it stands in the Pitt Rivers Museum, Oxford' 1902

Source: Tylor 1902

ON THE NORTH-WESTERN TRIBES OF CANADA. 565

boards of the roof are pushed aside to let the smoke escape. Household goods are kept on the platform; here are also the beds. The bed consists

FIG. 3.—Upright of Lku'ñgen House.

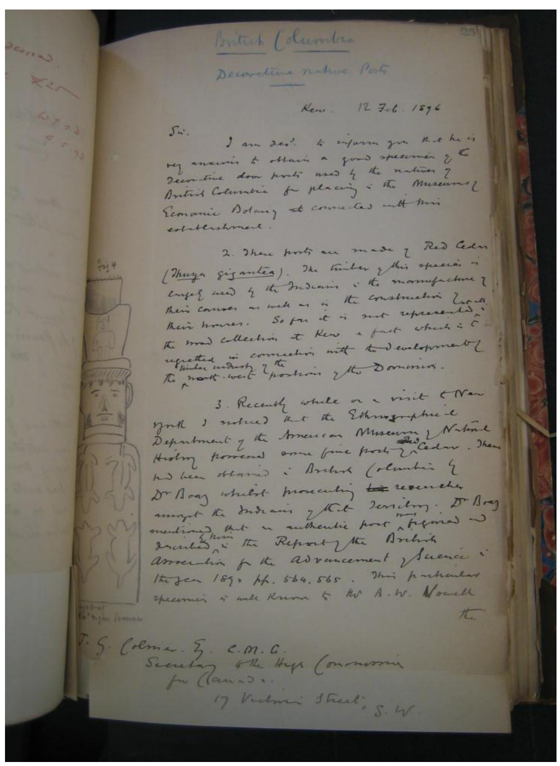
FIG. 4.—Upright of Lku'ñgen House.

of a number of mats made of bullrushes, the upper ends of which are rolled up and serve as a pillow.

At the present time the Lku'ñgen use only two kinds of boats: the

Figure 7.15 Detail from Boas's report to the BAAS Leeds 1890

Source: Boas 1891, 565



British Columbia

Decorative native Posts

Kew. 12 Feb. 1896

Sir.

I am des[ire]d to inform you that he is very anxious to obtain a good specimen of the Decorative door posts used by the natives of British Columbia for placing in the Museum of Economic Botany connected with this establishment.

2. These posts are made of Red Cedar (Thuya gigantea). The timber of this species is largely used by the Indians in the manufacture of their canoes as well as in the construction of their houses. So far it is not represented in the wood collection at Kew a fact which is to be regretted in connection with the development of the timber industry of the north-west portion of the Dominion.

3. Recently while on a visit to New York I noticed that the Ethnographical Department of the American Museum of Natural History possessed some fine posts of Red Cedar. These had been obtained in British Columbia by Dr Boas whilst prosecuting researches amongst the Indians of that territory. Dr Boas mentioned that an authentic post was figured and described by him in the Report of the British Association for the Advancement of Science in the year 1890 pp. 564, 565. This particular specimen is well known to Mr A. W. Vowell the

J. G. Colmer. Esq. C.M.G.
Secretary to the High Commissioner for Canada.
17 Victoria Street, S.W.

Figure 7.16 Letter from Daniel Morris to the High Commission for Canada 12 February 1896

RBGK Archives MR/615, f.259

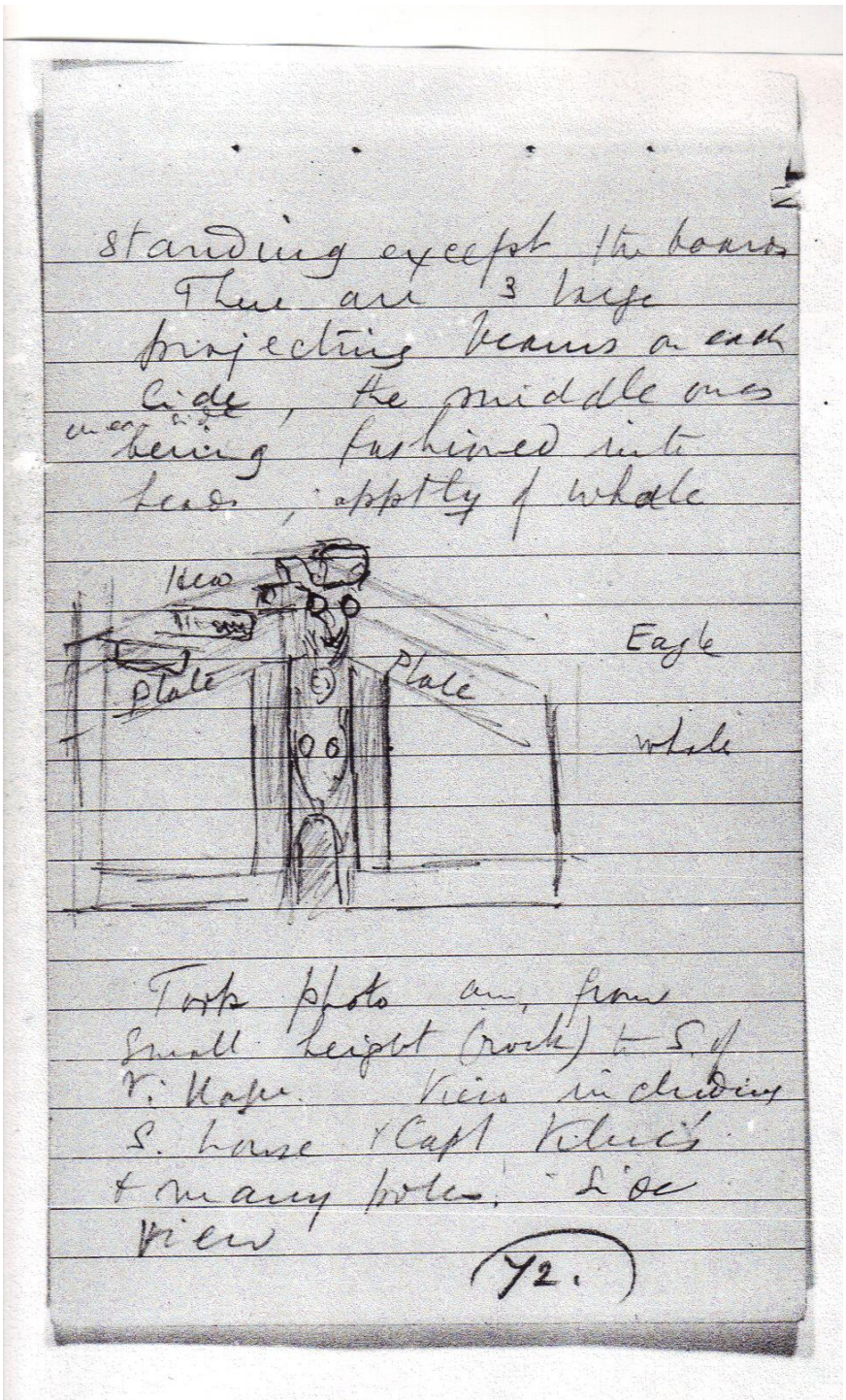


Figure 7.17 Sketch of Kew pole in Newcombe's notebook, Tuesday 14th September 1897

Source: BC Archives, Newcombe Family Papers, MSS 1077, Volume 55, Folder 8

Image reproduced courtesy of Royal BC Museum

Figure 7.18 Kew pole in its original context – as the door post of the house of Mrs. Thomas Moody in Tanu 1897

Image PN 959 courtesy of Royal BC Museum

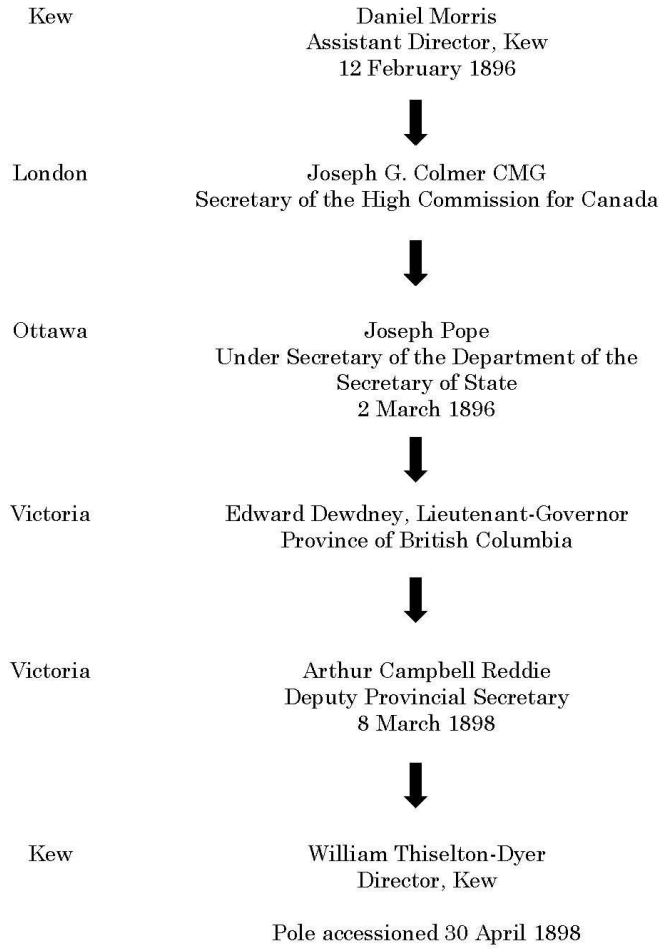


Figure 7.19 Chain of communication between Kew and Canada

Figure 7.20 Museum No. 3 with totem pole at far end c.1900

Photograph by E. J. Wallis; KPI W-442 ©RBG, Kew

Figure 7.21 British Museum Register 1958

Image reproduced courtesy of the British Museum

Figure 7.22 'Haida door-frame', *Living and Dying* Gallery, British Museum

Image reproduced courtesy of the British Museum

CHAPTER EIGHT

Reconfiguring Objects, Refashioning Space: The Tasmanian Timber Trophy

> Timber is a great feature here. That group of tall masts which rises from the centre, and from the top of which floats a small flag close to the roof of the building, is made up of blackwood. They are only saplings, mere babes in the Tasmanian woods…When fully grown, the wood becomes black; hence its name. The young saplings in the trophy are white, and give no indication by their colour of their parentage. The forests of Tasmania afford, in addition to the blackwood, the lordly Eucalyptus, of which there are many specimens in the collection. It grows 180 feet in height, and is often found ten or twelve yards in circumference. There are other trees even taller than this, some reaching an altitude of 300 feet. The Stringy Bark is another of the trees which are shown. From one of these, planks have been cut eighty feet long, six inches thick, and nearly a yard in width. The Huon pine, the myrtle, and the blackwood bear a beautiful polish; the marking and colours of the woods deserve the attention of the visitor. Planks of this timber, finely polished, are arranged round the sides of the trophy
>
> McDermott 1862, 117-8

So enthused the author of the *Popular Guide* in response to the Tasmanian Timber Trophy at the London International Exhibition of 1862. This 'noble' trophy (IE 1862a, 102) soared upwards from the Tasmanian court into the aerial space of the north-eastern transept (Figure 8.1). It signalled the might of Tasmanian woods – their scale and their durability – but beyond that it

spoke of Tasmania as a land of natural resources and human opportunity. The trophy acquired meaning from its position within the exhibition, but equally it afforded meaning to the space of the exhibition. It was fashioned in accordance with pre-ordained guidelines, and used in turn by Her Majesty's Commissioners to fashion the International Exhibition as an imperial space (RSA 1860, 787).

By the mid-nineteenth century, the term 'trophy' had come to indicate a particular phenomenon of the exhibitionary complex – an ornamental or symbolic group of objects, serving as a token or evidence of a country's might in terms of its natural resources or principal manufactures. Trophies had been a feature of the Great Exhibition of 1851 where they were prominent in the central avenue (Figure 8.2). They had their ideological origins in the 'triumphs' of ancient Rome – lavish parades and displays of war booty – and had first appeared in their modern form at the French national exhibitions of the Napoleonic era. As one commentator has remarked, 'here industrialists, rather than soldiers, were the new national heroes' (Davis 1999, 139). By the Paris exhibition of 1855, Edmund Dixon recorded that trophies, 'combining the productions of a country into one artistic group' were one of the leading features (Dixon 1856, 379). Notwithstanding the increased number of trophies in evidence in 1862 (Anon. 1862a, 5), the Tasmanian Trophy was conspicuous by its scale and form, and was generally lauded in the popular press. It was 'noble' according to the *Daily News* (Anon. 1862b, 2) and a worthy cause of rejoicing in the opinion of *John Bull* (Anon. 1862c, 361).[1] The extent and frequency with which it appeared in the columns of the dailies and weeklies suggests that it became a defining feature of the exhibition.

[1] *Daily News*: founded 1846 to provide a Liberal rival to the Conservative morning newspapers. *John Bull*: founded 1837 and catered to a more Conservative readership.

Tasmania, or Van Diemen's Land as it had been named up to 1856, held a special place in the history of Kew and its Museums. Since the time of Joseph Banks, Kew had been known throughout Europe for its 'extensive' collection of Australian plants.[2] Indeed, Banks was the self-appointed botanist on James Cook's first voyage (1768-71) which visited parts of Australia and New Zealand, and on the second voyage, dedicated to the exploration of *Terra Australis* (1772-75), he managed botanists Johann Reinhold Forster, Georg Forster, and Anders Sparrman from his metropolitan cabinet. Furthermore, he appointed Robert Brown as botanist to Matthew Flinders's Australian expedition from 1801 to 1805. Dating back to Joseph Hooker's visit to Australasia in 1840 as part of the Ross Antarctic Expedition, Tasmanian species first arrived at Kew in 1843, and some of these were later absorbed into the Museum collections. It was some time, however, before they achieved wider circulation. Hooker had published the first part to his *Botany of the Antarctic Voyage – Flora Antarctica* – in 1847. But the sequels – *Flora Novae Zealandiae* and *Flora Tasmaniae* – would not be published until 1853 and 1859 respectively, on his return from the Himalayas. By 1862, then, the *Flora Tasmaniae* was still a recent publication; for Hooker and for other botanists Tasmanian plant species were very much of current interest. Hooker acknowledged the contribution made by all his Australian collectors in compiling these floras, but in the preface to the *Flora Tasmaniae* he singled out Tasmanian botanist William Archer and acknowledged Archer's contribution of 'a beautiful series of drawings of Tasmanian Orchids, together with £100' and his 'still more valuable aid by his observations and collections'.[3] The lives of William and Joseph Hooker and Archer were entangled in the Timber Trophy. In 1860 Archer, who had been studying botany in England, returned to Tasmania and thereafter enjoyed a

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[2] 1845 (280) *Kew Gardens. Copy of Report from Sir W. J. Hooker, on the Royal Botanic Gardens, and the proposed new Palm House at Kew,* p.4

[3] Stilwell, G. T., 'Archer, William (1820–1874)', Australian Dictionary of Biography, National Centre of Biography, Australian National University, http://adb.anu.edu.au/biography/archer-william-1460/text4151; accessed 21 March 2012.

convivial correspondence with William Hooker which involved the exchange of specimens, publications, photographs, and anecdotal forms of knowledge.[4] He became one of the Tasmanian commissioners for the 1862 Exhibition, and was not only instrumental in ensuring that all botanical specimens submitted by the Colony were prepared and ticketed according to Kew's preferences; he also used his considerable influence amongst his fellow commissioners – by 1860 he was a member of the Tasmanian legislature[5] – to permit Kew to receive all unrequired botanical specimens at the Exhibition's close. As Archer related, 'I impressed upon my brother Commissioners the desirability of making many specimens over to Kew Gardens, and pointed out the benefits already conferred upon the Colonies by you.'[6] At South Kensington in 1862 the Tasmanian exhibits were scrutinised by three Kew officers: William Hooker as Director, Joseph Hooker as Assistant Director and exhibition juror, and John Reader Jackson as Curator of the Museum of Economic Botany. After the exhibition, the Timber Trophy, or at least a section of it, was sent to Kew and situated in the new Museum which was dedicated to colonial timbers (Museum No. 3). There it underwent a series of transformations as successive epistemologies waxed and waned at Kew.

As the previous chapter concerned the power of place in determining meaning for a given object, so this chapter will adopt Bernard Lightman's approach in considering 'the places of power' – those sites where scientific knowledge is produced, and how they are fashioned and re-fashioned in order to produce epistemic systems (Lightman 2011). Two sites in particular form its focus – the 1862 International Exhibition in South Kensington and the Kew Timber

[4] RBGK Archives, DC Volume 75

[5] Letter to WH dated 23 November 1860; RBGK Archives, DC Volume 75, f.1

[6] Letter from Archer to William Hooker 22 September 1863; RBGK Archives, DC Volume 75, f.3; see also letter from Archer to William Hooker 20 February 1862, DC Volume 75, ff.2-2a: 'I will endeavour to obtain for you an opportunity of making a selection from among the articles exhibited for your splendid Museum at Kew'

Museum. They are linked via the medium of a particular object, the Tasmanian Timber Trophy, and in part the chapter constitutes a biography of this object. However, I also consider Museum No. 3 as a site which itself underwent a process of refashioning at a number of critical points in the epistemic history of Kew and its Museums, and this might be considered what Lightman terms a 'site biography' (2011, 27). Refashioning museum space in response to shifts in botanical thinking may involve changes in architectural iconography and scale, and new technologies of interpretation, but it inevitably involves objects – the type of objects selected, their spatial disposition, and, in extremis, their physical reconfiguration – in order to better illustrate new 'ways of knowing' (Pickstone 2000).

A number of questions drive the enquiry. How were architecture, space, and objects used to create a narrative of imperial progress at the 1862 Exhibition, and what contribution did the Tasmanian Timber Trophy make to the imperial space of the exhibition? And, since the conditions surrounding the production of objects are of equal import to their biographies, what were the Tasmanian commissioners hoping to achieve with the Trophy, and to what extent were those hopes realised? What was the effect of the 'Kew gaze' upon the Trophy? And perhaps most importantly, how was the Trophy used to fashion and refashion the space of Museum No. 3 through a succession of epistemological turns? This chapter foregrounds the agency of space, whilst constructing an account of the co-production of new knowledges from the combined agency of site, people, and objects. The first section considers the spatial context of the 1862 Exhibition and the second section retraces the Trophy's journey there, considering en route the circumstances surrounding its production, its reception at South Kensington by various publics and by Kew Museum officers, and finishing with a consideration of the Trophy in the new spatial context of Museum No. 3. The third section looks at the lives of the Trophy after its installation in the Museum, and how it was reconfigured to represent changing

epistemologies and priorities, most notably its role in the refashioning of the Kew Museum to better represent the 'new botany'.

1. 'Steel and gold, and corn and wine': colonial raw materials at the London International Exhibition 1862

Lo! The giant isles,
Rich in model and design;
Harvest tool and husbandry,
Loom and wheel and engin'ry,
Secrets of the sullen mine,
Steel and gold, and corn and wine,
Fabric rough, or Fairy fine,
Sunny tokens of the line,
Polar marvels, and a feast
Of wonder, out of West and East,
And shapes and hues of Art divine!

Alfred Lord Tennyson 1862

Alfred Lord Tennyson's ode written for the opening ceremony of the 1862 International Exhibition pinpointed its salient theme: the extent of the British Empire and its resources, with the mother country represented by its technological achievements – 'loom and wheel and engin'ry' – whilst its colonies provided the raw materials – 'steel and gold, and corn and wine'. The theme was mediated in a variety of ways (Figure 8.3), beginning with the type of objects admitted. Exhibits were required to be 'particularly illustrative of objects which are the sources of present wealth and prosperity, or of indigenous products which there is reasonable presumption may hereafter prove to be of economic value or commercial importance' (cited in Hoffenberg 2001, 103). In 1861 the Exhibition Commissioners and the RSA published their 'decisions on points relating to the exhibition' (IE 1862a, 50). Since a key objective was to illustrate the progress made since the Great Exhibition of 1851, all 'works of industry' submitted were to have been produced during the last decade. The

government of each polity wishing to participate was to appoint a commission which would make the initial selection of exhibits from those submitted to it. In the event of any possible controversy, however, the commissioners in London would have the last word on the matter (IE 1862a, 50). The extent to which participating states or nations could use the exhibition to advance their own agendas was, therefore, shaped by the regulations and motivations of two sets of commissioners, at local and metropolitan level. At the exhibitionary site there were further constraints of space: the particular location of a given court within the overall architectural scheme, for example, and the courts or other attractions which lay in the immediate vicinity. Ultimately, the square footage allocated to a given court was the single most important influence on the messages that could be broadcast, particularly those regarding the breadth and depth of colonial timbers and minerals.

The site chosen for the Exhibition was in South Kensington, on a plot bounded by Prince Albert's Road to the west, Cromwell Road to the south, and Exhibition Road to the east. The exhibition building, designed by Captain Francis Fowke R.E., was a brick structure with a roof of glass and cast iron. It suffered, perhaps inevitably, from comparisons with the Crystal Palace, particularly with regard to architectural innovation. Its main point of difference lay in its scale; it covered a total of twenty-five acres and contained one and a half miles of upper gallery space.[7] According to Greenhalgh, as a public landmark the building was a 'popular failure' (Greenhalgh 1988, 154). Press reaction in certain quarters was hostile, the *Penny Guide* declaring, 'Viewed from without, its general characteristic is that of simple ugliness' (cited in Greenhalgh 1988, 153), with Cassell's Guide taking a more humorous line: 'The building viewed from end to end, previous to its being filled with objects, presented an aspect something like a cathedral, to which a Manchester

[7] The footprint of the Crystal Palace had covered nineteen acres (Dodd 1862).

warehouse and a railway shed had somehow become almost unaccountably connected' (Cassell 1862, 3). The building's contents, however, were quite another matter.

The layout of the exhibition site can be seen at Figure 8.4 which illustrates the geographical organising principle. If entering by the Cromwell Road, the British courts were to the visitors' immediate right. According to the *Official Catalogue* (IE 1862a, 98), ninety-three per cent of the total area was dedicated to Britain; three per cent to her colonies and dependencies; and four per cent to foreign commissions. This acted as a powerful spatial statement of British global pre-eminence, although the actual surface area of British territories in 1862 was considerably more modest. The courts of the British colonies were mostly situated in or adjacent to the North Eastern Transept, beyond the Eastern Dome. The exhibition was a popular success, and it was the objects on display which made it so; it received over 6,200,000 visitors, and by the time of its closure the *Illustrated London News* reported, not unsentimentally, 'Of one thing we are sure, that most of the visitors during the last two weeks have been influenced by a feeling of regret at the prospect of the final dispersal of such a collection as many of them can never hope to gaze on again' (Anon. 1862e, 563).

Australia at the 1862 Exhibition

In 1862 the Australian colonies consisted of New South Wales, Tasmania, Western Australia, South Australia, New Zealand, Victoria, and Queensland. The Northern Territory would not come into existence until the following year, and the federation which became known as the 'Commonwealth of Australia' was still thirty-eight years away. Consequently participation in the 1862 Exhibition was by individual colony, allowing for some expression of more localised agendas. In 1851, the Australian colonies had, according to one

source, been 'but poorly represented', with only New South Wales and Tasmania presenting 'creditable' displays (IE 1862b, 99). By contrast, in 1862 Australia as a whole was highly visible, with all seven colonies exhibiting, occupying thirty-five per cent of the space allocated to the Colonial Section. They were situated in the North Eastern Transept in close proximity to each other, immediately to the north of the Minton majolica fountain – a popular meeting place which guaranteed traffic flow to the colonial courts. However, they were equally situated alongside other colonies – Jamaica, Malta, Nova Scotia – a number of which were direct competitors for investment and labour. There were, too, internal tensions over the extent to which the Australian colonies should aim to achieve a proto-national representation or differentiate themselves from their neighbours. They were, after all, each trying to attract capital investment and encourage emigration. And along with conflicting motivations from within and without, there was the further problem of agency. Colonial identities were 'filtered' by the British exhibition organisers who controlled the location and the size of the courts, and the categories of goods on display. The risk was of being 'substantially subsumed within a British framework' (Douglas 2008, 17) and the means to counter this lay in the objects displayed. Here too, however, a number of factors served to determine the types of objects which were eventually exhibited. Funding for exhibits came largely from voluntary exhibitors such as learned societies and private individuals but this could result in incoherent displays and a 'cabinet of curiosities' approach, with exhibits 'crammed together with little regard for the implications of their juxtapositions' (Douglas 2008, 22). 1862 exhibition commissioners in the Australian colonies were for the greater part eminent citizens and male, so their own tastes and biases exerted a further filtering effect on object selection.

Australia's colonies were caught between 'their desire to present a picture of modernity, democracy and civilisation and the perception of them as places for

exploitation, and at the very best, of opportunity and potential' (Douglas 2008, 14). Competing with Britain and other more industrialised nations over manufactured goods made little economic sense, yet there was a desire to be perceived as more than a source of raw materials for the Empire. The Australian courts were filled with minerals, wool, timber, and cereals as potential export goods; working machinery also played an important part, both in attracting visitors to the courts and in articulating colonial identities (Hoffenberg 2001, 136). Bearing in mind these institutional, economic, and spatial constraints, I now consider the Tasmanian Court, how timbers functioned in its displays, and how they helped to fashion the exhibitionary space.

2. The Tasmanian Timber Trophy

The Tasmanian Court displayed wool, minerals, agricultural produce, and products of the whaling industry, but it was dominated by 'a noble trophy, rising 90 or 100 feet, made of its native woods' (1862a, 102). Since Tasmania was settled by the British in 1803,[8] its merchants had sought to export its natural products in order to import the range of goods required by the new colony (Dargavel 1987, 164). Timber, however, had proved difficult to market. Most of the Tasmanian trees were hardwoods and grew to massive dimensions, but took a long time to season, splitting, cracking, and warping if prepared too quickly. Whilst this did not diminish the strength of the wood, it could adversely affect its appearance (1987, 165), and the story of Tasmanian woods abroad in the nineteenth century became characterised by efforts to demonstrate their strength and durability, and thus to overcome resistance to any deficiencies in their appearance. The colonial authorities had long hoped to supply timbers to the British ship-building industry, and the Admiralty had placed an order in 1833 but again the appearance of the woods weighed against

[8] It had been a penal colony since 1788

them and many 'bad timbers' were returned (cited in Dargavel 1987, 166). Tasmania's display at the Great Exhibition had been described as 'creditable' in the Official Catalogue (1862a, 99), and it had been awarded ten prize medals – six of which were for woods – and nineteen honourable mentions across all categories.[9] But there was a view that the overall presentation had lacked clarity of purpose and cohesiveness of design (Sweet 1997, 241), indeed Archer referred to it as 'a vast hodge podge'.[10]

The International Exhibition of 1862, therefore, offered Tasmanians a chance to present their wares to the 'mother country' in a more positive light. There were political as well as economic issues at stake; convict transportation to the colony had ceased in 1852 and Tasmania was now a self-governing state in search of export markets, investors, and an emigrant population. Twenty-four leading Tasmanian citizens from administrative, business, and scientific backgrounds were appointed as commissioners to organise the Tasmanian Court. Timber was to occupy 'the most conspicuous position' and, inspired by the Canadian Timber Trophy at the 1851 Exhibition (Figure 8.5), a timber trophy was designed by the Secretary to the Tasmanian Commissioners, George Whiting, to showcase Tasmania's woods (Whiting 1862, 4). In order to execute the considerable task of preparing the materials for the Trophy, the remaining convicts at the Port Arthur Penal Settlement were set to work cutting 'specimens of planking and other timber, the size and quality of which can scarcely be equalled by any other country' (cited in Dargavel 1987, 166).[11] The planks included blue gum (*Eucalyptus globulus*) and stringy bark (*Eucalyptus obliqua*) of up to one hundred feet in length (Figure 8.6).

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[9] Circular: 'Inter-national Exhibition Commission: Commissioners for Tasmania', 29 April 1861; RBGK Archives, Exhibition Correspondence 1862

[10] Letter from Archer to William Hooker dated 23 November 1860; RBGK Archives, DC75, f.1

[11] One of the Tasmanian commissioners was James Boyd, commandant at Port Arthur Prison

Two sources offer particularly informative accounts of the conditions surrounding, respectively, the production and reception of the Timber Trophy. The first is Whiting's own *Products and Resources of Tasmania,* a pamphlet which acted as both a mission statement for the Tasmanian Commission and as a catalogue of the exhibited objects; the second is the *Handbook to the Industrial Department of the International Exhibition, 1862* by Robert Hunt who was keeper of the mining records at the Museum of Practical Geology. According to Whiting, the basic structure of the Trophy was to consist of an octagonal column, formed of eight one-hundred feet spars of blue gum, stringy bark, white gum, silver wattle, blackwood, and sassafras. The gaps between the spars were to be filled by eight large planks set on end, of blue gum and stringy bark. The base structure was to consist of planks of blue gum and stringy bark, representing ships' timbers, and blackwood and myrtle as examples of cabinet woods. And there was to be an interior spiral staircase formed of Huon pine – a 'free-working and almost imperishable wood'. But apart from so-called 'plain' timbers, the trophy was also to incorporate a number of specialised wood-cuts necessary to ship-building. Large ships' knees – the section of a tree where the trunk meets the root – had been in such short supply internationally that British naval architecture had had to be modified. Because of their strength, knees were used for bracing and structural elements in ships, and Tasmania claimed to have 'an unlimited supply' (Whiting 1862, 14-15).

In the supporting literature great emphasis was placed on the durability of the woods; those selected for the Trophy were 'shown in every variety of kind and condition' (Whiting 1862, 4), from the 'green' woods which, Whiting was quick to point out, had been affected by 'shakes' and 'sun-cracks' (1862, 11), to fully-seasoned specimens, and timbers taken from the oldest public buildings of the colony. These included door-posts, window-lintels, and architraves from the Old Gaol and the Old Court House of Hobart Town, posts from its wharves,

sleepers from its railways, and ships' timbers which had experienced many years of active service. In short, the Trophy itself was to be a 'Museum of the more useful Tasmanian Woods' (1862, 11). Whilst doubtless intended as a scientific exercise, the physical fragments of the former penal colony must have excited the curiosity of metropolitan audiences, providing opportunities for urban imaginaries of antipodean crime and punishment.

But although the old woods were 'well-authenticated' by the denizens of Tasmanian society, scientific data were also required to make the case conclusively. The catalogue cited the tests conducted in 1851 by Mr. Mitchell, DAC General, and the paper read before the Royal Society of Tasmania, in which a comparison was made between the woods of Tasmania, and those of India and Europe. The results indicated that blue gum would sustain double the weight of English oak before it broke, and would even recover its elasticity after bearing a weight at which oak would break. However, Mitchell's tests were only conducted on blue gum, swamp gum, and stringy bark, and by 1862 the Tasmanian commissioners were also keen to promote She oak, Huon pine and peppermint wood, which, they claimed, 'appear to be nearly impervious to atmospheric influences' (Whiting 1862, 14). Whiting called for a 'Commission of Enquiry' to examine and report on the various woods in the Exhibition, as a means for the British Government to find proven alternatives for oak. In fact this was already in hand; Captain Francis Fowke, the engineer who had designed the Exhibition building, was charged with testing the woods on display, to 'assist in determining to what extent they are likely to prove worthy of attention for export' (Watson 1862, 153). Woods were tested according to a range of criteria: specific gravity, breaking weights, crushing weights, and recovery from deflection, and the results were published in 1867. Although English oak was not tested on this occasion, a number of the Tasmanian woods – blue gum, stringy bark, and peppermint – out-performed Indian teak with

regard to breaking weight, significant because teak had previously been the Admiralty's most popular choice after English oak (DSA 1867, 277-279).

In the meantime, however, the quality of the Tasmanian woods needed authentication from a renowned botanist. William Archer FLS wrote an appendix to *Products and Resources of Tasmania* in which he reiterated the argument consistently made by the Tasmanian commissioners, but with the authority of the Linnean Society behind him: that Tasmanian hardwoods were ideal substitutes for English oak in ship-building and construction. The descriptions in his article adopt the nomenclature approved by Kew systematic botanists, but in all other respects they belong to the economic realm:

> BLUE GUM.– (*Eucalyptus globulus*, Lab.) – The common name is derived from the bluish-grey colour of the young plants. Diameter, 5 to 30 feet; average of those felled for use, 6 feet. Height, 150 to 350 feet; sp. grav. about .945 to 1.055. Abundant in the southern and south-western parts of the Island. Cut for house-building it sells at 8s. to 10s. per 100 superficial feet – for ship-building at 12s. to 14s (Whiting 1862, 28).

From both Tasmania's and Kew's perspectives, Archer was an excellent choice to confer botanical authority on the Tasmanian woods. He was, as we have seen, one of Kew's Australasian collectors and throughout his colonial residency sent many specimens to Kew, some of which were named after him. When in London from 1856 to 1858 he was elected a fellow of the Linnean Society. He visited the Kew Herbarium on a number of occasions to conduct research and in 1857 he brought along 'an excellent herbarium, copious notes, analyses, drawings, and a fund of accurate information on the vegetation of his native island' which he placed unreservedly at Joseph Hooker's disposal for the writing of the *Flora Tasmaniae* (Hooker 1859c, cxxvii). So Archer was not only known and respected by William and Joseph Hooker, but he was familiar with Kew's methods and practices.

The Trophy occupied a prominent position at the Exhibition (Whiting 1862, 4). Although partially hidden by the Foster and Andrews organ in front of it, the latter was a popular attraction which brought visitors into the eastern zone of the building (Shaffner & Owen 1862, 39). To Hunt, as he surveyed the Exhibition, the Tasmanian Court was 'one of the most attractive and numerously-frequented in the building' and the Trophy was 'not inelegant' (Hunt 1862, 332-335). Hunt gives a valuable eye-witness's description of the Trophy, the detail of which is difficult to discern from contemporary pictorial sources, due to the enclosure around the structure's base. It sat on a platform of squared logs, heavy planks and ships' timbers which were in turn scored over with boards of stringy bark, the whole of which rested on a foundation of solid masonry. The pedestal to the monument was a parallelogram of thirty by twenty feet across and twelve to fifteen feet in height, consisting of various construction timbers; the 'gallery' – a railed open area on top of the pedestal – had a floor of blue gum boards. There was a spiral staircase rising through the centre made of Huon pine, and lined with ships' planks of stringy bark, and white and blue gum. Within the pedestal and around its walls were ships' knees and crooks 'of a gigantic size', as well as decorative woods including ironwood, muskwood, blackwood, myrtle, and Huon pine. The pedestal itself was hollow and entered by a doorway atop two short flights of steps. To either side stood casks made of blackwood and silver wattle which supported two lower jaws of the sperm whale 'with the points upwards and their double row of trenchant teeth towards the spectator' (Figure 8.7), the whaling trade being the secondary theme of the Trophy. Within the Tasmanian Court could also be found articles of furniture made both in London and in Tasmania. The former acted as a representation of the uses of Tasmanian cabinet woods to overseas producers; the latter to confound notions of life in the Colony as lacking in comfort and sophistication. 'Delicately-finished [botanical] drawings in water-colours, executed in her usual felicitous and artistic style' by Mrs. Charles

Meredith, served the same purpose, lending to the Court an element of feminine gentility.

The Trophy and the Kew gaze

Press reports were generally positive, often reproducing the description in Whiting's pamphlet (Anon. 1862a, 7; Anon. 1862d, 5). This was no coincidence; 10,000 copies of it were dispatched to a British audience which included newspapers, politicians, and entrepreneurs, or given away in the Court (Sweet 1997, 245). Nor did William Hooker find anything off-putting in the Trophy's appearance; indeed he described the assemblage as 'magnificent collections',[12] evidently envisaging it as a museum object. These were species hitherto unrepresented in the Kew Museums and exciting from both a botanical and a commercial viewpoint. Curator John Reader Jackson, too, described what he saw as 'a fine series of woods, all very large specimens, many polished and named, some exceedingly beautiful specimens of Huon Pine.'[13] Here, the use of the word 'series' is interesting, as the variously aged and seasoned woods did indeed act as an illustrative series, demonstrating the durability of Tasmanian timbers. Since many were polished and labelled with both their 'Native' and botanical names, they appeared to Jackson as ideal museum objects. But Jackson also demonstrated an aesthetic sensibility, frequently describing the woods in terms of their beauty. There were two reasons for this: the first was the mode of looking at objects in terms of their potential for spectacle, referred to in Chapter Six as the exhibitionary gaze; and the second was a reflection of the mid-Victorian taste for the fancy and exotic.

We should also consider the role played in the selection process by Joseph Hooker, who, along with Canadian botanist William Saunders, was a juror for

[12] J. Hooker's original notes on the 1862 Exhibition; RBGK Archives, QX 92-053 Miscellaneous

[13] J. R. Jackson, 'Notes on the collections in the International Exhibition'; RBGK Archives QX 92-053 Miscellaneous

the woods of the British Colonies. Their report was published verbatim by the RSA so as 'not to impair the value of their remarks' (RSA 1862, 47). The involvement of scientists of the status of Joseph Hooker imbued not only the displayed products, but also the exhibition as a whole, with scientific authority. Scientists at exhibitions helped develop standards and conventions of display and classification which facilitated the circulation of specimens between exhibitions and museums. Joseph Hooker's role as juror, therefore, added weight to Kew's requests for specimens. His own interest in the Tasmanian woods is evident in the Jurors' Report:

> A splendid and most important collection is exhibited, the contribution of twenty-three individuals; the specimens in general of great size, well-selected, seasoned, and cut, scientifically named, and accompanied with manufactured articles showing their application. There is a want, however, of good catalogues and of information as to the trees in general, their prevalence, duration, growth, &c. (RSA 1862, 35)

First of all, the Tasmanian woods were 'splendid' in their size, seasoning, and cutting; they shone at the Exhibition and they might do likewise in the Kew Museums. They were 'most important' from a botanical perspective because these species were hitherto little-known in England and from an economic viewpoint they suggested new commercial applications. As a result of the liaison between Kew and Archer, they were scientifically named, using Kew's preferred conventions of nomenclature;[14] this conferred further value on them as botanical specimens. Yet, at the same time, they formed part of an illustrative series, accompanied by manufactured articles of the same species. Indeed the only area in which they appeared to him deficient was in the lack of accompanying biogeographical and sylvicultural data. What is particularly interesting in Hooker's commentary is his use of indigenous knowledge to project future usages for 'new' woods; the Banyalla (*Pittosporum bicolor*) was

[14] Letter from Archer to William Hooker, 20 February 1862; RBGK Archives, DC Vol. 75, ff.2-2a

described as a very hard wood, of uniform texture and colour, 'once used for clubs by the natives'. Since it was known to turn well, Hooker proposed that it should be tested for wood-engraving, identifying new usage opportunities based on knowledge of indigenous practices and of the inherent properties of the material (RSA 1862, 35-36). It is therefore not surprising that in his 1862 annual report, William Hooker spoke of the duties entailed by the exhibition being rewarded 'beyond all proportion remunerative' for the collections presented to Kew, in particular 'the superb series of Timbers and Ornamental Woods' (Hooker 1863, 1).

Before the Exhibition opened, William Hooker anticipated possible resistance amongst commissioners to Kew having first selection of the exhibited collections. In an attempt to overcome this, he persuaded the Duke of Newcastle, the Colonial Secretary, to send out a circular to colonial governors, requesting that Kew be allowed any unclaimed objects from the courts when the Exhibition closed on November 1st.[15] This was distributed in April before the opening on May 1st. By September William Hooker received notice that the Governor of Tasmania had agreed to this request.[16] Hooker was interested in acquiring the Timber Trophy, but first needed confirmation of its base dimensions. Frederick Du Croz, one of the London-appointed commissioners for Tasmania, wrote to Hooker in October, informing him that the shorter side was twenty feet in length, 'and therefore there would be six feet space on each side, if erected in a certain manner'.[17] This is significant on two counts: firstly, it shows that the Orangery had already been 'ear-marked' as the new timber museum, since its width is thirty-two feet; and secondly, that the assembly of the trophy was at best open to interpretation and potentially troublesome. In

[15] Circular from the Duke of Newcastle to Colonial Governors dated April 28, 1862; RBGK Archives, Letters etc. – International Exhibition 1862

[16] Letter from Frederic Rogers at the Colonial Office to William Hooker, 22 September 1862; RBGK Archives, Letters etc. – International Exhibition 1862

[17] Letter from DuCroz 28 October 1862; RBGK Archives, International Exhibition 1862

November Du Croz invited Hooker to meet up at the Tasmanian Court and 'to arrange whether and how any portion of our present trophy can be erected at Kew'.[18] The woods and the 'castings' – perhaps cast-iron support structures or the 'masonry' referred to by Hunt – arrived at Kew in mid-December.[19]

The Timber Trophy at Kew

As William Hooker noted in his Annual Report for 1862, 'in no previous year have the donations to these buildings been so numerous and valuable' (Hooker 1863, 3). The total number of woods acquired by Kew from the 1862 Exhibition was vast and remains unquantified,[20] but the provenance of those specimens remaining in the Collection in 2012 can be seen at Figure 8.9. After the Kew Museum had made its own selection, a large quantity was distributed to a range of public and private herbaria and museums (Hooker 1863, 5). While this represented the largest exercise thus far undertaken by Kew as clearing house for the wider institutional community, Kew's status in this regard was far from universally acknowledged. Du Croz seemed quite non-plussed by Kew's interest, informing Hooker that:

> It will afford us much pleasure to carry out those instructions but as you have already a large Tasmanian collection from the Paris Exhibition of 1855 we should esteem it a favour if you would send to the court, or otherwise designate such specimens as would be desirable. We are anxious to disseminate as much as possible the productions of the Colony and your decision would enable us to decide what further distribution we can make.[21]

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[18] Letter from Du Croz 28 November 1862 to Hooker; RBGK Archives, International Exhibition 1862

[19] Letter to Hooker from Du Croz 10 December 1862 in which he estimates that the Trophy will be dismantled by 13 December; RBGK Archives, International Exhibition 1862

[20] Most entries for the 1862 Exhibition in the Kew Museum Entry Books were not quantified

[21] Letter to Hooker from Du Croz 20 October 1862; RBGK Archives, International Exhibition 1862

Du Croz was a businessman whose working life had been spent between London and Tasmania,[22] and his aim in the post-exhibition dispersals was the widest-possible circulation of Tasmanian products. His comment suggests that the Kew Museum's role as clearing house for plant materials was neither stable nor uncontested in 1862.

For reasons that are unclear from the existing records, the acquisition of the base of the Trophy selected by William Hooker and Jackson was not recorded in the accession register; what we next learn of it comes from Hooker's annual report for 1862, in which he made reference to the woods of several named colonies – including Tasmania – acquired from the Exhibition. The specimens were 'of large size, selected from sound Trees, and cut with great judgement, partially polished, and often of uncommon beauty'. They had been 'formed at great labour and cost, under the immediate direction of men of scientific attainments and excellent practical knowledge, who have attached the proper names to every specimen, and added a vast amount of serviceable information on the uses, qualities, and abundance of the woods, in their annexed reports.'

A conflicted account of the Trophy within the setting of Museum No. 3 emerges from contemporary accounts. On the one hand William Hooker was able to say in his 1863 annual report, that among the various displays, 'Tasmania holds the most conspicuous place for the magnitude and beauty of its specimens' (Hooker 1864, 3). On the other hand, there appear to have been difficulties in displaying the Trophy, or that portion of it which came to Kew, to general satisfaction, and this recalls Du Croz's comment that the trophy's dimensions

[22] His company bought land and wool, acted as import and export agents for many pastoral estates and became ship-owners; Mead, Isabella J., 'du Croz, Frederick Augustus (1821–1897)', Australian Dictionary of Biography, National Centre of Biography, Australian National University, http://adb.anu.edu.au/biography/du-croz-frederick-augustus-328/text5259, accessed 2 March 2012.

would fit the space of the Orangery if 'erected in a certain manner, but there doubtless are difficulties'.[23] In 1864, only one year after the opening of Museum No. 3, the central timber trophy was 're-arranged' (Hooker 1865, 4); and in 1865, the 'great central timber trophy' was 'taken down and greatly improved, and many of the large specimens polished' (Hooker 1866, 5). Although there are no close-up images of the base of the Timber Trophy, by referring to the Canadian Timber Trophy of 1851 which had inspired it, the nature of the problem becomes more evident (Figure 8.5). The latter was a loosely-arranged structure, which would conceivably be difficult to re-construct satisfactorily in a museum. The *Illustrated London News* had called it 'an uncouth sort of pile' (Anon. 1851); perhaps the Tasmanian Trophy base was equally unsatisfactory.

In the 1866 *Official Guide*, we have the first tantalising glimpse of the Tasmanian Trophy, positioned in the centre of Museum No. 3 (Figure 6.4). Its rectangular shape suggests it must have been the parallelogram-shaped pedestal of the original monument, but frustratingly no detail is given in the supporting text. The remaining Tasmanian woods were displayed against the northern wall of the Orangery, adjacent to woods from other Australian states, so it is they which were used to fashion the Museum as a collection of colonial timbers. The Trophy, conversely, from its position in the centre of the Museum, was more identifiable as another of the 'large articles unsuited for exhibition in the glazed cases of the other Museums' (Oliver 1863, 1). Indeed, the presence of at least one of the 'historic' woods from the original exhibit – a joist made of Blue Gum, taken from the old court house in Hobart Town (RBGK 1886, 60) – may well have lent it an air of curiosity.

[23] Letter from Du Croz to William Hooker 28 October 1862; RBGK Archives, Letters etc. – International Exhibition – 1862

3. Kew and the 'new botany'

In his 1876 annual report, Joseph Hooker announced that all the Museums were 'in a most crowded condition' and that Museum No. 3 could take no more exhibits. To provide accommodation for new objects, and also to 'more strictly define the scope of the collections' (Hooker 1877, 27) the Curator, Jackson, and Assistant Director, Thiselton-Dyer, had begun a systematic revision of the entire collection. There was to be no duplication of specimens; objects would only be retained on grounds of 'usefulness throughout the vegetable kingdom' or 'structure', introducing a new emphasis on plant physiology. Separate collections 'of merely technological interest' were to be broken up and re-distributed (Hooker 1877, 26-27). Examples of objects dispersed under this new order included 'three sectional models of boats' which had been acquired from the Vancouver Island Court at the 1862 Exhibition, and which were transferred to the South Kensington Museum. In Thiselton-Dyer's opinion these were of exclusively technological interest.

By 1878 Hooker was able to report that, 'the contents of No. 3 Museum have also been carefully revised, and an immense number of duplicate and useless specimens withdrawn. Great improvements have also been effected in the display of the larger objects, especially the fine specimens of the stems of palms and tree ferns' (Hooker 1878, 44). The displays were taking a decidedly physiological turn. The museums to which material was transferred included the Botanical Department of the British Museum, the India Museum, the City Industrial Museum in Glasgow, the University Museum in Cambridge, and the Jardin des Plantes in Paris. It seems likely that the Timber Trophy was removed at this point. It was in the Museum Guide of 1875 but by the revised edition of 1886 it had disappeared and the Tasmanian woods were to be found 'distributed on the front, back, and end walls of the building, as well as in the galleries' (RBGK 1886, 60). For the first time, in this guide the woods were

itemised and this gives a clearer indication of Kew's holdings of Tasmanian timbers by the late nineteenth century.

In the material evidence borne by some of the 1862 Tasmanian woods still held at Kew, there is a suggestion that the Trophy had been dismantled and reconstituted as elements of the larger collection. At least two specimens in the current collection bear a series of holes and wooden pegs along their edges, suggesting they were originally slotted together as part of a larger structure (Figure 8.9). A further specimen is stamped with the words 'Port Arthur', connecting it unmistakeably with the woods prepared for the trophy at the former penal colony (Figure 8.10). Under the new criteria, the Trophy had been redefined as a separate collection of mere technological interest. Its new value was as a data series, but in order to move from one epistemic state to the other, it had literally to be reconstituted as individual specimens, with the best examples retained, and those which had deteriorated, disposed of.

The dismantling of the Timber Trophy is reflective of an epistemic shift in nineteenth-century botany which originated in Germany with Wilhelm Hofmeister and Julius von Sachs and was observable in British botany from the early 1870s. Aside from economic botany, botany at Kew had hitherto consisted of systematics – the practices of identifying, naming, and classifying plants. As one 'eye-witness' – botanist Frederick Bower – put it:

> The whole energy of Kew, and of the British Museum, of Edinburgh and Glasgow, and in a minor degree of other centres, had been concentrated upon the floristic exploitation of the British Dependencies. The cataloguing of the floras of these lands raised far-reaching questions of geographic distribution, which readily worked in with the then novel views on descent. It was indeed the commanding interest in such matters which had tended to draw attention away from the intensive study in the laboratory. Even the most active professors of the 'sixties

> and 'seventies of the last century allowed their interests to be directed into restricted channels by the set of the Imperial stream, though they might well have been spread over the whole field of botanical science. This resulted in a lop-sided state, from which a minor revolution was needed for recovery (Bower 1938, 26-27).

With the mass-production of more powerful microscopes from the 1850s came a new interest in plant physiology, a branch of botany which concerned itself with the functions of plant organisms and their parts (Gooday 1992, 321). This new 'way of knowing' concerned the substitution of 'anatomy for classification, organism for structure, internal subordination for visible character, the series for tabulation' (Foucault 2002, 150). Bower described it as 'the description of functionating organisms and the comparative treatment of their parts' (Bower 1938, 75).

A key figure in the dissemination of this new approach in Britain was Thomas Huxley. As we saw in Chapter Five, Huxley introduced microscopy into his classes at the Normal School of the Royal College of Science, South Kensington in 1872 (Gooday 1992, 308-309), thus refashioning the Department of Science and Art as a space of 'scientific naturalism' – a concern with the secularisation of nature, the professionalization of science, and the promotion of expertise (Lightman 2011, 36). Whitehead argues that demarcation is an important step in the construction of disciplines (Whitehead 2009, 73), and here Huxley was quite literally demarcating this new science by securing for its practice a dedicated space with its own specialised equipment (Forgan & Gooday 1996, 446-55). After Huxley's morning lecture, student teachers worked in the afternoons with microscopes under the guidance of demonstrators, thus enabling the student to 'see, confirm, or criticise for himself' (Bower 1938, 46). This was the 'trained judgement' described by Daston and Galison, whereby the demonstrators highlighted particular patterns, ignoring others (Daston &

Galison 2007, 46). One such demonstrator became a key figure in the spread of physiological botany to Kew: William Thiselton-Dyer. In 1873, Thiselton-Dyer took responsibility for the course and introduced an additional course in experimental botany, including evolutionary theory and comparative morphology (Drayton 2000, 245). When he moved to Kew in June 1875, he was permitted to continue this work and organised further courses in 1876 and 1880 (Jones 1998, 278). 1875 was also the year in which Sachs's seminal work, the *Text-book of Botany, Morphological and Physiological*, was published in English, translated by Alfred William Bennett and Thiselton-Dyer.

Thiselton-Dyer's appointment as Assistant Director in 1875 marked the reinstatement of the post which had been suppressed when Joseph Hooker became Director in 1865. Hooker was now ten years into his directorship, and all the activities of the Royal Botanic Gardens – collecting, corresponding, and consulting – had increased greatly over the period (Hooker 1876, 1). William Turner Thiselton-Dyer, the son of a physician, was an alumnus of King's College School and graduate of natural science from the University of Oxford. He had been professor of natural history at the Royal Agricultural College, Cirencester, from 1868 to 1870, thereafter taking up the chair of botany at the Royal College of Science in Dublin. This was followed in 1872 by his appointment as professor of botany at the Royal Horticultural Society in London, a post for which Joseph Hooker had recommended him, and by the close of 1872 Hooker was also employing him part-time at Kew.[24] As Drayton observes, Thiselton-Dyer was the product of a different age to Joseph Hooker, an age of middle-class opportunity, of science in the university, and of Darwinism in biology. He had built a professional career without the

[24] Bernard Thomason, 'Dyer, Sir William Turner Thiselton- (1843–1928)', *Oxford Dictionary of National Biography*, Oxford University Press, 2004 [http://0www.oxforddnb.com.catalogue.ulrls.lon.ac.uk/view/article/36467, accessed 1 Aug 2009]

Sir William Turner Thiselton-Dyer (1843–1928): doi:10.1093/ref:odnb/36467

patronage of amateurs, and he had not needed to undertake a voyage of exploration, as had Hooker, to build his scientific reputation (Drayton 2000, 240). By the 1870s he was 'the pre-eminent botanist of his generation in Britain' (2000, 245).

At Kew, Joseph Hooker and Thiselton-Dyer were to effect their own 'minor revolution' (Bower 1938, 27). As we have seen, this was achieved partly through objects. Collections of structural interest, such as the cryptogamic plants, were afforded more display space; that this decision was structure- rather than utility-led is indicated by Hooker's comment that these were 'objects of increasing interest to the large numbers of persons who make the study of some branch of natural history their recreation' (Hooker 1877, 27). New collections were formed. A separate collection illustrating vegetable pathology was commenced in 1874 and by the following year it had grown to three hundred specimens. As Hooker reported, it promised to be 'one of the most interesting features of the museums, no public collection having hitherto been formed to illustrate the diseases and the transformations of the organs of plants' (Hooker 1876, 12).

But this 'physiological' episteme was also associated with the construction of new scientific spaces. The fourth report of the Devonshire Commission in 1874 had recommended that 'opportunities for the pursuit of investigations in Physiological Botany should be afforded at Kew'.[25] However, as no government funding was forthcoming, Hooker and Thiselton-Dyer approached the scientific benefactor Sir Phillip Jodrell, who granted them £1,500 for the building and equipping of a physiological laboratory at Kew.[26] With Thiselton-Dyer in charge, scientific research began there in 1876; since there was no budget for

[25] 1874 [C.884] *Fourth Report of the Royal Commission on Scientific Instruction and the Advancement of Science,* p.10

[26] Hooker, J. D. to Darwin, Letter 9771, 22 December 1874, Kew; Darwin Correspondence

staff it was made available to distinguished scientists for the pursuance of research of a chemical, physiological, or microscopic nature (Jones 1988, 277-80).

This series of events must also be set against the background of what is often referred to as the 'Ayrton Controversy' – the exchanges from 1870 to 1873 between Joseph Hooker and Acton Smee Ayrton, the First Commissioner of Works, or 'the technocrat clashing with the bureaucrat' (Drayton 2000, 212). As discussed in Chapter Five, Ayrton saw an opportunity of reducing public spending by transferring Kew's scientific research function to the British Museum (BM), leaving the Royal Botanical Gardens as a public recreation park.[27] He had gone so far as to procure the services of Richard Owen, then Superintendent of the BM's Natural History Department, to pen a statement dismissing Kew's scientific work as concerned 'mainly in economical relations', and pronouncing the need for a museum of natural history in a public garden as mere 'delusion'.[28] The addition of a physiological laboratory at Kew, particularly one which did not depend on government funding, was, therefore, a matter of political and scientific import. As Lightman argues, the addition of the Jodrell Laboratory helped to preserve Kew as a site where research continued to be one of its defining activities (Lightman 2011, 38). I would add that the new physiological approach implemented in the Kew Museums served to further shore up Kew's claims to recognition as a research centre of the first order, and acted as the public face of this new order of knowledge. This approach concerned, not only new collections and the revision of the existing collections according to their structural interest, but also featured the latest

[27] 1872 (335) Memorandum of the First Commissioner on the Management of Kew Gardens by the Office of Works, and the Changes therein, 15 July 1872; *Kew Gardens. Copies of papers relating to changes introduced into the administration of the Office of Works affecting the direction and management of the gardens at Kew; and of correspondence between the Treasury and Dr. Hooker on the same subject.*

[28] 1872 (335) 'Statement Relative to the Botanical Departments respectively under the Trustees of the British Museum and the Commissioners of Works', 16 May 1872, Appendix III

images of plant physiology from German wall-charts to photomicrographs, as discussed in Chapter Four. Under Thiselton-Dyer, the Museums were refashioned to accommodate and communicate the new botany, and the Tasmanian Timber Trophy was similarly reworked from a former exhibition attraction to a series of separate specimens in a scientific collection. To cite Alberti, it had moved 'from icon to datum' (Alberti 2005, 567).

The epistemic shift of the 1870s wrought the most significant changes on the Kew Museums since the opening of the first Museum of Economic Botany in 1847. But it was by no means the final turn, and in the concluding section I will consider the refashioning of Museum No. 3 over its lifespan (until its closure in 1959) in response to a series of intellectual and administrative transformations.

4. Conclusion: biographies of objects, biographies of places

As Carla Yanni argues, museums presenting a single master-narrative are rare. They are much more likely the result of a number of co-existing approaches, which renders museum display 'surprisingly resistant' to epistemic analysis (Yanni 1999, 8). When the first Museum of Economic Botany opened in 1847, its displays arranged according to the 'natural' system of Candolle, the timber specimens immediately presented spatial challenges:

> Under the manifestly unscientific head of "Miscellaneae" we are compelled to place a vast collection of Woods, of British and foreign origin, many beautifully prepared, and more or less cut and polished. A few indeed are placed in the arranged collection, for the purpose of illustration; but with regard to the majority, we can, with our present confined space, only pack them where we can best find place for them (Hooker 1855, 74).

Woods not in the arranged collection offered, furthermore, a challenge to the prevalent taxonomic arrangement:

> The extensive samples of Woods, British and Foreign, of this Museum, would alone require the entire Building to exhibit them in a useful and instructive manner. Here they can only be placed at present according to countries (1855, 77).

From inception, then, there was an alter-taxonomy for woods predicated on their size and geographical origin. It was inherited from exhibition categories, a considerable number of woods having been acquired from the Great Exhibition of 1851 and the Paris Exposition Universelle of 1855.[29] With the opening of the second Museum in 1857, Museums No. 1 and 2 were dedicated to dicotyledons and monocotyledons respectively. There was now more space to include wood specimens within the overall scheme, but there were still woods that disrupted it, including those of unknown species or of a scale exceeding that of the museum cabinets. Such 'surplus' woods were displayed in Museum 2 where, it was hoped, visitors would be able to shed light on their identification (RBGK 1883, 6), once again demonstrating how Kew used its museums as spaces of knowledge exchange.

The acquisition of the woods from the 1862 International Exhibition forced the issue of an additional museum, and Museum 3 was devoted to timber specimens and large articles – an awkward juxtaposition with scale as the common denominator. Because most of the timbers in Museum 3 had come from the 1862 Exhibition, the woods in the new Museum were '…arranged in groups according to the countries producing them, and not with any attempt at scientific classification, as in the other Museums' (Oliver 1866, 78). Since many of them were also duplicates of species already represented in the 'arranged' collections in Museums 1 and 2 (Oliver 1866, 78), the new Museum

[29] RBGK, EBC database

offered an opportunity for an alternative display principle, one which was easier for the commercial visitor to navigate. Individual specimens were labelled and the name of the country of origin was displayed over each section. What the new Museum offered was the space for larger 'show' specimens; the museum guide boasted, 'Here, their full diameter is shown, and the magnitude of many of our Colonial trees becomes the more striking' (1866, 78). Museum No. 3 was fashioned in the likeness of international exhibitions, and was no doubt intended to reproduce the popular appeal of those sites to commercial and general audiences alike. It was in many ways the joint product of William Hooker, whose stated aim was to popularise the science of botany, and to 'render it generally available' (Hooker 1856, 2), and the curator John Reader Jackson, who was not a scientist and whose interests lay in the visual appeal of display objects, and the practical applications of plants. It is pertinent here that it was Hooker senior and Jackson who had both singled out the Tasmanian Timber Trophy on their lists of desiderata.

I have described the changes implemented in the Kew Museums in the late 1870s by Joseph Hooker and Thiselton-Dyer as a refashioning process in the likeness of the 'new botany'. But physiology was not about to overshadow taxonomy at Kew. Commencing in 1877 at precisely the time that the collections were being revised along structural lines, the objects were relabelled and, in the case of Museums 1 and 2, re-arranged by Jackson according to the sequence of orders and genera in the *Genera Plantarum*. This new taxonomy was created by Joseph Hooker and George Bentham, and published in three volumes between 1862 and 1883; also known as the 'Bentham-Hooker system', it was the most comprehensive systematic survey at the time of the 'higher' plants. There was no reference in it to plant physiology, just as there was no mention of taxonomy in Sach's *Textbook of Botany*. As Bower succinctly put it, 'Few at that time held a balance between both: but Sir Joseph Hooker, like a Colossus, had a foot down in either camp' (Bower 1938, 102).

Just when it seemed that the Kew Museums might represent the latest developments in plant systematics and physiology, Museum No. 3 underwent a number of further spatial interventions. In 1883 iron galleries were added for smaller specimens, indicating a zoning of the Museum into the reference collection above and the exhibited collection on the ground floor. As seen in Chapter Four, this was a response to the 'new museum idea' advocated by William Henry Flower, signalling a further move towards serving the needs of specialists. Whilst in the new guide to Museum No. 1, published in the same year, Joseph Hooker was still affirming that the primary object of the Kew Museums was to show 'the practical applications of Botanical Science', he also introduced a new intention, that they should demonstrate 'the variety in form and structure presented by plants', and whilst they displayed plants of value as food, in construction, the arts, and medicine, they could also serve to satisfy scientific 'curiosity' (RBGK 1883, 3).

Chapter Seven described a new turn from the late 1890s to the early 1900s, embodied in the acquisition of the totem pole: a renewed interest in ethnographic collecting. This was brought about by Kew's interest in the burgeoning science of anthropology – increasingly seen as a relational discipline to economic botany – and the consequent compulsion towards 'salvage anthropology'. With the display of objects like the totem pole, the Museum now took on the role of cultural archive of past practices and knowledges. Morris was a key figure here, a scientist whose later career was associated more generally with tropical agriculture (Desmond 2007, 264-65).

After the rupture in collecting and botanical science imposed by World War I, there was again a shift in the fortunes of Museum No. 3: in 1926 the collections were re-arranged, as a result of the accession of new specimens and the disposal of old ones. Due to space limitations, it was no longer possible to display the woods in a strictly geographical order. Each exhibited specimen

was, therefore, given a number from 1 to 601 and a corresponding entry in the Guide (RBGK 1927, 3). The usages attributed to the woods were updated using a series of texts, many of which had been published within the previous twenty years.[30] In the introduction to the 1927 guide, Director Arthur Hill also signalled that there were timbers in the Museum that were not of 'general commercial significance', 'some through scarcity and others through lack of knowledge on the part of manufacturers outside the countries where the trees are found' (1927, 4). By 1927, then, the Museum was assuming a new role as an archive of disappearing woods. As regards manufacturers' lack of knowledge, since the re-avowed purpose of the Kew Museums in 1927 was to be 'as valuable as possible to manufacturers and others engaged in trade', there is some sense here of Kew losing its hold on the commercial sector. Furthermore, with the new layout Kew had thrown off the old geographical categories of nineteenth-century international exhibitions – just as imperial geographies were themselves undergoing radical changes – and forged an arrangement better suited to its spatial propensities, loosely based on a biogeographical principle. Some entries in the revised museum guide had scarcely changed from 1886, revealing the Museum as a heterodox space with traces of former epistemologies co-existing alongside subsequent ones. There were, for example, vestiges of those species reselected in 1876 for their structural significance. In 1862 as exhibition juror Joseph Hooker had written:

> Two ferns, *Dicksonia Antarctica* and *Alsophila Australis*, are both remarkable for the very peculiar markings of the wood when divested of the brown matted rootlets and bases of the leaf-stalks. Though not apparently adapted to any special purpose, they could no doubt be introduced into cabinet-work with great effect (RSA 1862, 36).

[30] Those pertaining to Australian woods were Baker 1919, Boulger 1902, Howard 1920, *Catalogue of the Empire Timber Exhibition* 1920

By 1927, they had not been adopted as cabinet woods, and survived as botanical curiosities and as evidence of 'salvaged' indigenous knowledge:

> **No. 5**. – Tree Fern, *Dicksonia Antarctica* Lab. (*Filices*). This giant fern is a native of Australia, Tasmania and New Zealand...It is of little economic use, but the soft, starchy centre of the upper part of the stem is used, raw and roasted, as an article of food by the aborigines...
>
> **No. 8.** – Alsophila australis Br., a tree fern from Tasmania, ornamental when growing but of little economic value (RBGK 1927, 6).[31]

There were no further editions of museum catalogues, and by 1958 Eric Ashby and his visiting group had circulated their landmark report on the future of the Royal Botanic Gardens. This recommended the closure of Museums 2 and 3, and pronounced that the only scientific value of the museum collections was as a reference resource. Accordingly it was argued that they should be 'drastically reduced in size and completely reorganised'.[32] The woods from Museum 3 were either stored in the former Museum 2, or merged with the British wood collections in Museum 4 to become the Wood Museum.[33] By 1987 the latter was closed and the woods, in line with the rest of the collection, were data-based and transferred to the purpose-built store in the Banks Building. Anecdotal evidence suggests that at this stage larger specimens were cut down to a size compatible with the new compactor units in the store, and that some

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[31] This is corroborated by furniture historian Adam Bowett: '1862 [was] part of a concerted push to find export markets for the [Australian] woods, but the problem was that they offered no significant advantage over woods already available from America and Africa. Additionally, the furniture trade has always been very conservative. Woods such as jarrah were sent for trial to major manufacturers such as Gillow and Jackson & Graham, and although reports were favourable, they stuck to trusted materials like mahogany.' (Adam Bowett 4 February 2011, *pers. comm.*)

[32] RBGK Archives, Report of a Visiting Group to the Royal Botanic Gardens, Kew (Chairman: Sir Eric Ashby) [in March 1957] Great Britain. MAFF (¶18; ¶20, ii)

[33] Considerable redistributions of woods occurred at Kew further to the Ashby Report, but Tasmanian woods do not appear to have been amongst them (RBGK, EBC, Distributed Specimens Vol. 2).

further 'weeding' of the collections took place predicated on the condition of specimens.[34]

Currently the wood collection has a number of recognised uses at Kew: as a means for wood anatomists of identifying woods referred to Kew; as a teaching collection for students of wood anatomy from the Jodrell Laboratory; and as a resource for researchers of imperial, museological, and environmental histories and geographies. Wood structure is still central to the collection's continued existence, but the collection no longer acts as an assemblage of 'useful' timbers in the nineteenth-century sense of the word, but rather as an archive of those woods which were once available in 'unlimited' supply.

In the light of the above account, it is clear that the Kew Museums can certainly be seen as the 'malleable spaces' described by Lightman (Lightman 2011, 44). Simon Naylor has likewise argued for the role of 'biographies of place' in the research of the practices of science (Naylor 2005, 11), and such a perspective complements and complicates the object biography approach advocated in much current literature on museum collection. From William Hooker's original vision in which economic and systematic botany were synthesised, through the exhibitionary geographies of Museum No. 3, to the physiological botany of Thiselton-Dyer, the Museums were variously fashioned and refashioned to communicate and embody successive epistemologies. This refashioning process was inevitably a selective one, in which elements of earlier systems survived, producing a palimpsest effect. It was implemented largely through the type and spatial disposition of those objects exhibited, and through interpretative techniques. And it was also effected through the spaces of print culture – through museum guide-books and labels, scientific reports, and the popular press. Whereas previous chapters have demonstrated how the

[34] Interview with Laura Ponsonby, former Museums Assistant, 19 April 2011

knowledge produced around a given object is spatially contingent, the case of the Timber Trophy has further demonstrated that neither the meanings nor the forms of objects are fixed once they enter the museum. Both objects and the spaces they occupy can be quite literally refashioned to embody new 'ways of knowing' (Pickstone 2000).

Figure 8.1 Tasmanian Court with Timber and Whaling Trophy, 1862 Exhibition

Photograph: London Stereoscopic and Photographic Company; image reproduced courtesy of State Library of Victoria

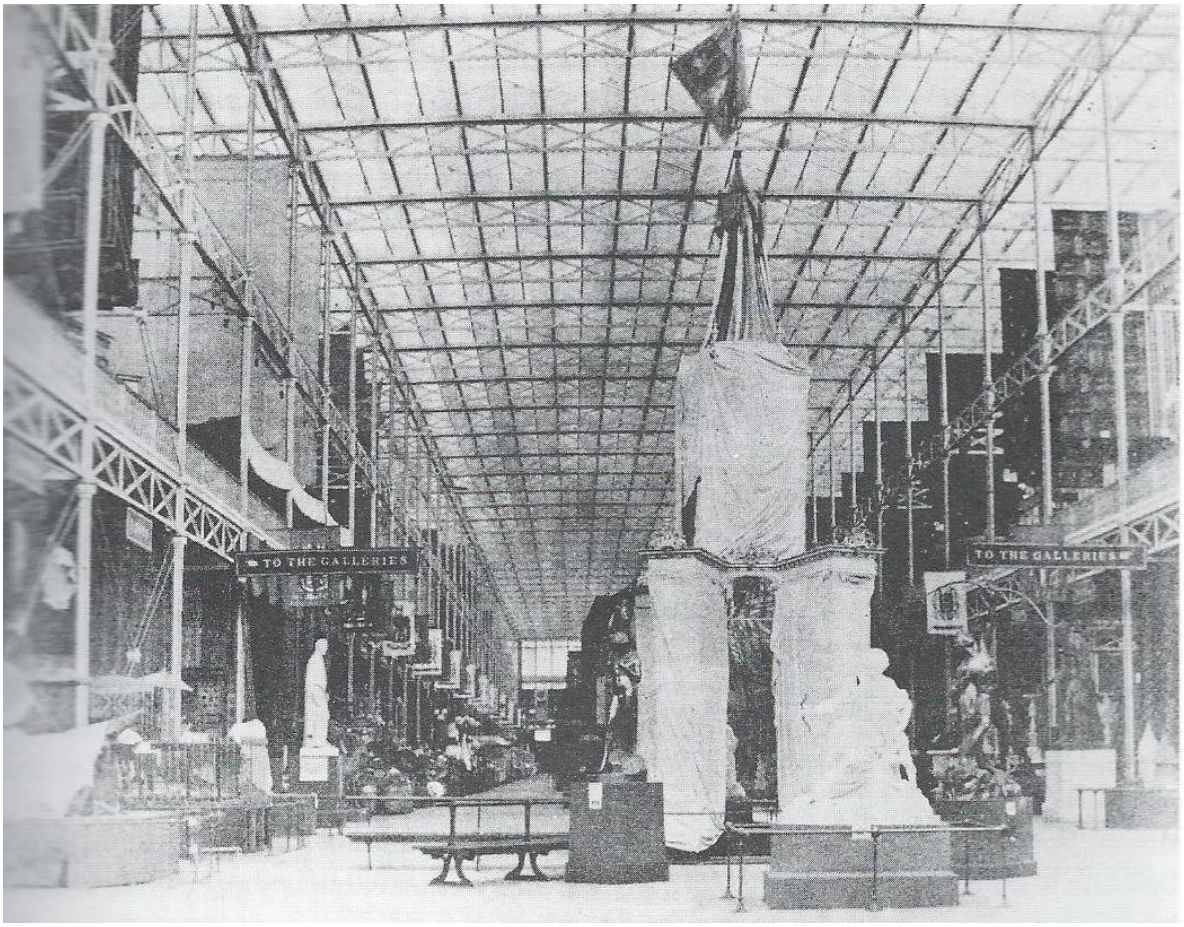


Figure 8.2 The Great Exhibition 1851

Source: Davis 1999

Figure 8.3 'Pictorial Companion to the Great Exhibition 1862'
Illustrated Weekly News

The mother country was represented by its technological achievements as signified in the cast metal lettering, whilst its colonies were depicted as sources of raw materials, connoted here by the timber letters.

Image reproduced courtesy of the National Art Library

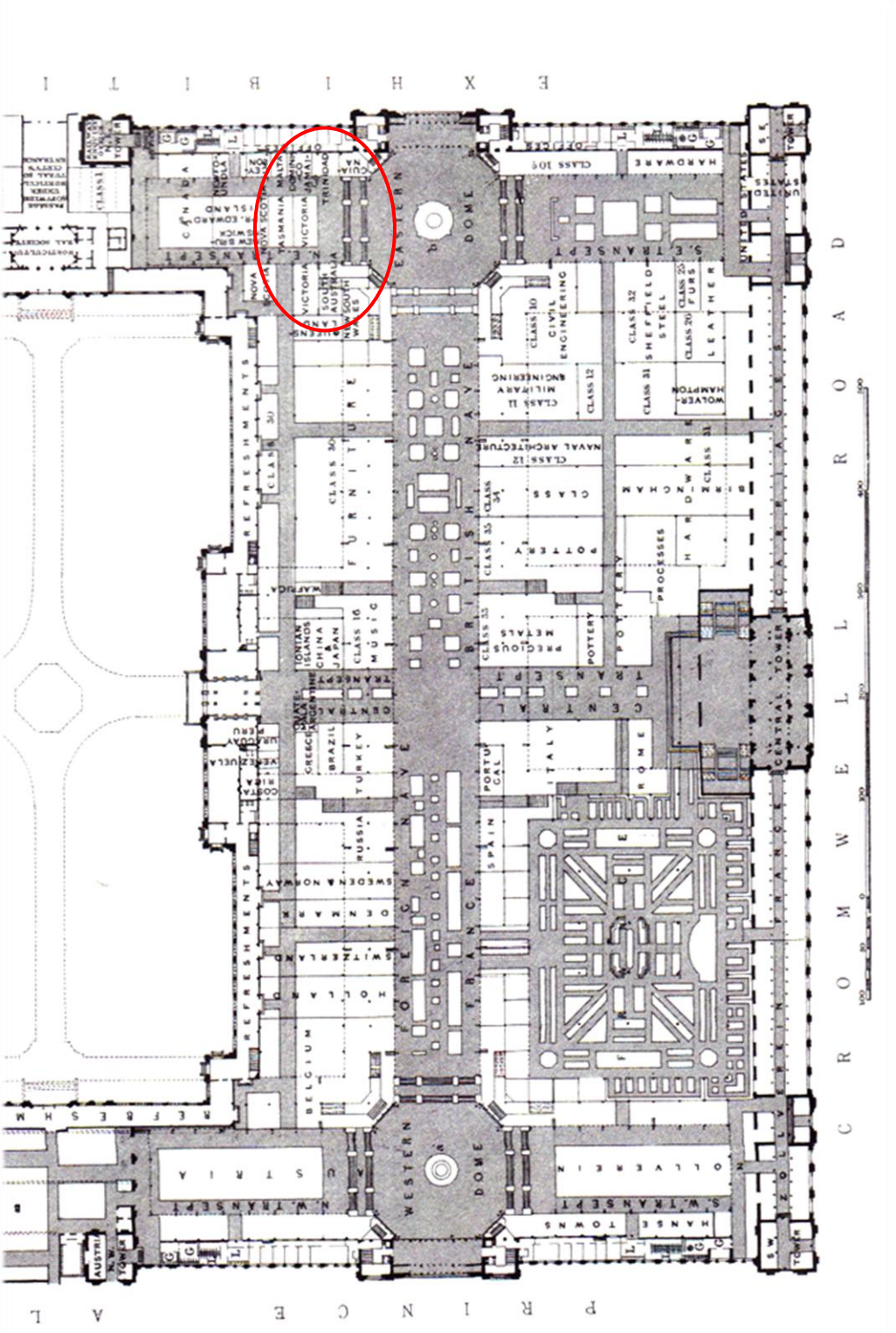


Figure 8.4 1862 Exhibition: plan of the main exhibition building

Source: *Cassell's Illustrated Exhibitor* 1862

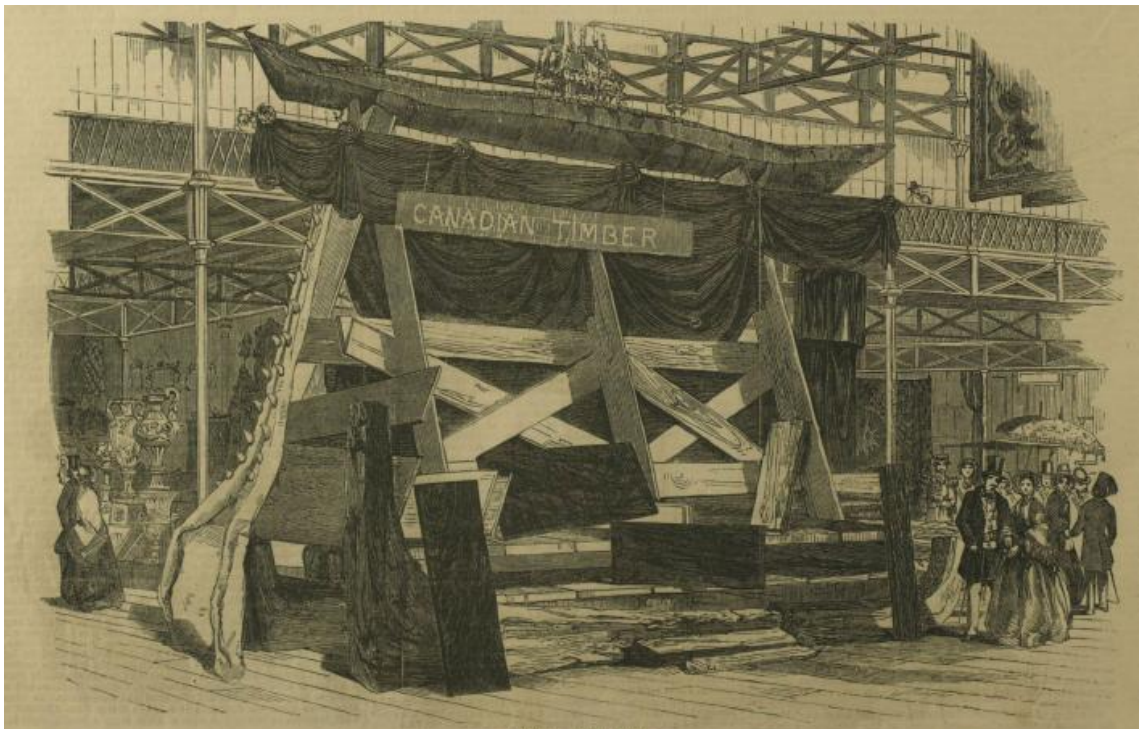


Figure 8.5 Canadian Timber Trophy, Great Exhibition, London 1851

Source: *Illustrated London News* June 21, 1851 ©2012 Gale

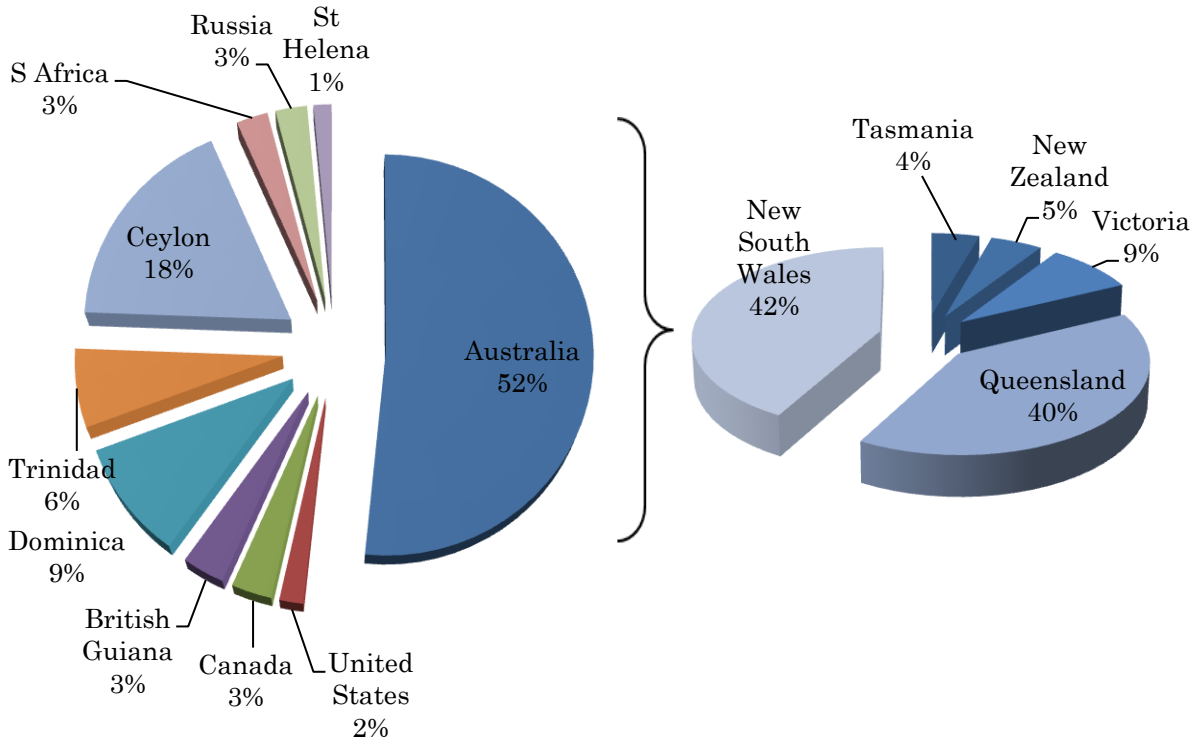
Figure 8.6 'Blue gum piles, one hundred feet long, awaiting shipment to England' 1861

Source: Dargavel 1987, 166

Figure 8.7 Close-up of base of Trophy during assembly, 1862 Exhibition

The sperm whale jaw-bones can to seen on the right, outside the enclosure

Photograph: London Stereoscopic and Photographic Company; reproduced courtesy of Michael Tongue



n = 548

Figure 8.8 Woods in the current Economic Botany Collection acquired from the 1862 International Exhibition

Source: EBC Database

Figure 8.9 EBC 31334 *Acacia dealbata,* Linn. (Silver wattle) presenting series of holes and pegs

Figure 8.10 EBC 31311 *Notelaea ligustrina* Vent. (Ironwood) displaying Port Arthur stamp

CHAPTER NINE

Conclusion

> Ours is the gratification of having set the example, which is now being followed in several of our colonies.
>
> Hooker 1856

William Hooker's comment, made in the course of his 1855 annual report, represents an early review of the contribution of the Museum of Economic Botany. Nine years after the opening of the Kew Museum, Hooker was able to enumerate a series of museums of economic botany supposed to have been established according to the Kew model: in Jamaica, Demerara, Melbourne; at the Botanic Garden of Edinburgh, and in Liverpool; at Calcutta, and at Madras; even, he said, at the Jardin des Plantes in Paris. He also reported that the EIC was 'forming a similar Museum in London', referring to John Forbes Royle's proposal for a Museum of the Raw and Manufactured Products of India to exist alongside the natural history collections at East India House (Desmond 1982, 78). These claims can be viewed with some scepticism. As noted in Chapter One, for example, Royle had been active in the formation of Indian economic botany from his appointment as superintendent of the Saharanpur Botanic Garden in 1823. Indeed, the natural history collections of the India Museum at East India House were inscribed with an economic purpose as early as 1799 in Charles Wilkins's original proposal. Similarly,

Hooker might be accused of testing his readers' credulity in claiming that the Parisian museums were formed in Kew's likeness, given France's distinctive trajectory in both the exhibitionary aspects of economic botany, expressed in its series of national exhibitions, and in the scientific aspects, as demonstrated in the work of Candolle and others. The history of economic botany has proved to be rather more of an iterative, and indeed, reiterative phenomenon than Hooker's distinctly imperial vision would allow. That said, as enumerated in Appendix IV, numerous museums of economic botany were formed after the establishment of the Kew Museum, and many were influenced by its model. Sometimes, as in the case of Harvard and Adelaide, they were provided with sets of specimens donated by Kew; sometimes, as at Missouri, they were housed in buildings designed in imitation of the Kew Museum. Moreover, unlike their predecessor, a number of these museums are still extant, representing some of the more physical incarnations of the legacy of the Kew Museum.

The global reach of Kew, including the Museums, Gardens, and Herbarium, provides one measure of its lasting significance. In this thesis I have focussed specifically on the Museums, which have received much less attention from historians than either the Gardens or the Herbarium. Each of these was designed to be part of a greater whole, and in this sense they ought all to be understood in the same frame. And yet it was the Museum, perhaps above all, which provided a space for developing and displaying the field of economic botany in its nineteenth-century form. By way of conclusion to this thesis, I discuss the contribution made by the Kew Museum to economic botany, not just as a physical model but as an assemblage of practices and procedures which helped to produce a particular form of scientific knowledge (Section 1). I go on to reflect on the methods and case histories developed in the earlier chapters, and on the implications of these choices for the stories that have and might be told (Section 2). Finally, I consider the present status and role of the Economic

Botany Collection at Kew, and the potential contributions of this research to Kew's current agendas (Section 3). And in an acceptance that all research findings raise as many questions as they answer, I end with a look forward to future areas of potential research.

1. Research questions and answers

What was the contribution of the Museum of Economic Botany to the field of knowledge of useful plants? And how did it produce scientific knowledge? The answer to these questions lies not simply in the physical reality of the Museum: rather, it can be found in every aspect of its operation. From the loftier concepts of systematic layout to the more routine practices of printing labels, the Museum was an apparatus of knowledge production. The examination of exhibitionary practices in Chapter Four revealed the extent to which the Kew Museum was innovative in its appropriation of devices and materials from other spheres – the domestic, the exhibitionary, and the academic – which it brought together in new ways under the authoritative mantle of the Royal Botanic Gardens. The Museum had the advantage of being part of this botanical complex, enabling it to reinforce its messages by reference to living plants in the Gardens, or to its Herbarium types and holotypes. Interpretative frameworks – as enacted in arrangements of botanical specimens, maps, models, commercial data, illustrations, and photographs – created new meanings for plants, and enabled the consumption of botany by the scientist, the capitalist and the craftsman. Drawing on prior practices in the display of manufacturing processes, and working closely with the commercial sector in networks of exchange, William Hooker and colleagues extended the concept of the illustrative series to the public presentation of botany, to become a defining feature of the Kew displays – displays which embodied the notions of process and progress.

Detailed consideration of the Museum's educational practices in Chapter Five highlighted the significance of William Hooker's emphasis on the importance of classifying the collection and arranging the displays on a systematic or taxonomic foundation, since it enabled Kew to shape economic botany as a discipline before the universities or other museums, and thus shaped subsequent scientific enquiry. A systematic arrangement was essential in establishing a disciplinary framework for the subject, and further, for distinguishing the Museum of Economic Botany from the wax-works or the side-show. Through practices of popular science – lecturing and writing – Kew botanists were able to shape botany curricula at the elementary and higher levels in ways consistent, not only with Kewensian views of scientific content, but also of pedagogical method. Through these means, and through its forty-year involvement in the school museums project, the Kew Museum assumed an influential presence in the nation's classrooms.

This brings us onto practices of circulation – the exchange of objects, texts, and letters – as well as publishing, 'associating' through learned societies, and botanical travelling, which served to produce further knowledge beyond the Museum's spaces. The Museum shared Kew's infrastructures and media of communication and circulation, and, as we saw in Chapter Four in the case of botanical illustration, could appropriate and re-present practices from the Gardens and Herbarium. Furthermore, Kew under William Hooker and his successors effectively re-established Banksian networks with the Admiralty, Colonial Office, RSA and Royal Society, and forged new ones with agencies of colonial government and science, diplomacy, academia, and commerce, to name but a few. This was a means for the Museum, not only to grow its own collections and knowledge of useful plants, but also to disseminate 'the Kew way' of seeing and knowing economic botany.

These three sets of practices – concerned with display, dissemination and circulation respectively – were central to the development of Kew's strategic priorities in the nineteenth century. In other words, far from being a marginal curiosity, this thesis has sought to demonstrate that the Museum lay at the heart of the Kew complex during this period. The themes of exhibition, instruction, and supply drawn from Lindley's founding statement, as discussed in Chapter One, have thus proved particularly effective routes into the wider question of Kew's role in the making of scientific knowledge and the formation of economic botany as a discipline.

What was the nature of the knowledge thus produced? Clearly scientific knowledge was represented through the display of plant systematics, anatomy and physiology, and through its constantly growing collections, the Museum became an ever-changing physical manifestation of the known vegetable kingdom. But most importantly, the Museum demonstrated the relationship between plant characteristics and plant utility; it showcased plant properties, and it provided the deductive means for visitors to apply that knowledge to new plants found in new contexts. In addition, maps and statistics assisted the conversion of hitherto unknown plant species into commercial opportunities, and the juxtaposition of specimens with indigenous products inspired manufacturers and craftsmen to create new designs, new objects, and new usages for plant materials. This knowledge was produced by what John Pickstone describes as 'museological' science, a form of science which is neither purely descriptive, nor, on the other hand 'experimentalist' or dependent on control over phenomena in laboratories (Pickstone 1994, 113). In the Kew Museum, as we have seen, such practices created new knowledge, and shaped botany in new ways. And the museological knowledge practised there was not directed purely towards the task of constructing displays. Part of the curators' daily workload involved the identification of specimens submitted by traders, by reference to the displayed collection, library texts, or by referral to the

Herbarium. It could also involve transfer to specialist laboratories for testing, with the costs borne by the trader and the knowledge shared by all parties. This practice of 'taxonomic triage' (Dritsas 2005, 50) offered a number of mutual benefits: the Museum grew its collections and its knowledge of useful plants; and it demonstrated its own utility to both government and tax-payers. And traders received specialist knowledge on plant species and their properties, and on industry contacts.

The focus on display, dissemination and circulation reflected in the structure of this thesis has also foregrounded questions about the spatiality of knowledge production throughout. As we have seen, the Kew Museum's use of space through its systematic displays and its juxtaposing of different types of materials was productive of a range of scientific knowledges. The spatial and institutional context of the Royal Botanic Gardens conferred scientific authority on the Museum's innovative assemblages, and offered additional ways of viewing the plants displayed within the Museum's cases. A particularly intriguing aspect of the Museum's *modus operandi* is the extent to which the Museum's displays were designed to be incomplete, with gaps soliciting knowledge and specimens – or to put it more formally, 'inquirenda' and 'desiderata' – from its visitors. This was the terminology of Baconian science which enjoyed something of a revival amongst nineteenth-century scientists and collectors.[1] In fact the terms 'inquirenda' and 'desiderata' can be traced to Bacon's 'Recapitulation of the deficiencies of knowledge...to be supplied by posterity', a list of fifty-plus desiderata with which he concluded *De Dignitate et Augmentis Scientiarum* (Bacon 1623).[2] In the tradition of Baconian empiricism, the declaration of what is not known forms part of the scientific method for attaining full knowledge, and explains the confidence with

[1] For example Timbs 1838, 229; BAAS 1839, xv; Newman 1857, 5838

[2] Certain of these had direct relevance to the Kew Museum, including 'the history of arts; or nature formed and wrought by human industry'.

which Kew Museum officers could advertise their own 'deficiencies' (Oliver 1861, 3-4). And in the Museum guide-book, the word 'desiderata' was conflated to signify both objects and facts, providing a further example of the primacy of the object in nineteenth-century science.

But this has not been just a Kew story. Through its methodological focus on networks and object biographies, it has also considered spaces of knowledge far beyond Kew. Following the lives of things has taken us beyond the Museum's walls, backwards in time to points of origin and, in the case of the totem pole (Chapter Seven), forwards to onward destinations. And despite opening this chapter with William Hooker's Kew-centric narrative of the Kew Museum as the centre from which knowledge of economic botany diffused outwards, the thesis has presented the Museum of Economic Botany as a key site in a developing network operating at a number of levels. At the local level, the Museum formed part of the community of London museums, some of which, such as the India Museum, had economic botany collections which predated those at Kew. Objects were regularly exchanged between the members of this community, arriving at Kew in vans from South Kensington or barges up the Thames, as described in Chapter Six. At the national level, the Kew Museum was a holder of a national collection and as an actor in this network, acquired access to well-established 'kindred' institutions such as the botanic gardens of Edinburgh, Dublin, and Belfast, and other museums of science, industry, and ethnography (Figure 6.14). Finally, as Chapter Six has also striven to demonstrate, the Kew Museum operated at the international level, actively constructing networks with, for example, Indian institutions of collecting such as the Indian Museum, Calcutta, and the Imperial Forestry Institute at Dehra Dun.

2. Methods, sources, choices, consequences

As narrated in this thesis, the details of the story of the Kew Museum have in some respects gained lives of their own. Yet in view of recent concerns about the limits of the case study in the history of science (Secord 2004), it should be emphasised that this was never intended to be a series of micro-histories. Whilst I have indeed sought to recover the sensual, affective, and epistemological dimensions of the Museum's spaces, I have also been keen to situate those spaces in the wider contexts of science, imperialism, trade, education, and leisure. And while individual objects are studied in depth – notably in the object biographies presented in Chapters Seven and Eight – they are also situated within the broader perspective of the Collection as a whole. To reiterate the idea expressed in the opening chapter, what underlies this study is a conception of the Museum as a dispersed and mutable assemblage of people and things. Here there is nonetheless 'a unifying narrative' (Secord 2004, 656) or rather an historical geography of the Museum of Economic Botany, focussing on the production of scientific knowledge in its spaces, its regions of operation, and its networks of circulation and exchange. To achieve this narrative, which has involved constantly shifting perspective from the micro- to the macro-scale – as from the exhibitionary heterodoxy of Museum No. 3 to the coastal forests of British Columbia, or conversely from the database to the datum – a degree of methodological eclecticism has been required in which writers such as Livingstone, Appadurai, and Latour appear, metaphorically speaking, as bed-fellows. Such theoretical approaches relating to the spaces, material culture and networks of science respectively are bound together by the focus on objects. Museum and other spaces have been treated here in terms of the meaning they impart to objects, and indeed, objects have been approached as means of fashioning spaces (Chapter Eight). Objects are what take us, spatially and temporally, from the rack in the collection store to the Imperial Forestry Institute at Dehra Dun (Chapter Six), and from the sun-

lit dustiness of Museum No. 2 to the forests of British Guyana (Chapter Four). Objects have agency in this thesis since their very existence caused the formation of networks between people and institutions but they also possess agency through their materiality, expressed in terms of their utility, their rarity, and their aesthetics. And since the period covered in the thesis is that in which the object was perceived as the *sine qua non* of science teaching, the decision to focus on objects seems particularly apt.

But such choices, of course, have consequences. In order to make the subject manageable, an early decision was made to focus on woods. A justification for that decision was provided in Chapter Three, *viz.*: that the historical geographies of woods in the Collection were under-researched; that woods were representative of the wide variety of types of objects in the Collection, including raw materials, ethnographic artefacts, and manufactures; and that woods were as representative as they were individual, and would thus potentially yield more general insights into the historical geography of the Museum. The objects selected for more detailed scrutiny included ethnographic, interpretative, and raw materials. As a consequence, for the first time in the historiography of Kew, its timbers have been studied as historical objects, with individual biographies and unique trajectories. At the same time, the industrial and commercial opportunities they represented – and, more specifically, the grounds on which they themselves were deemed to be typical and therefore suitable objects for acquisition and display – have also been given their due.

At the outset, as in any study, temporal and territorial limits to this project were also set. The greatest archival focus was on the period from the 1840s to the First World War, extending somewhat the chronology of the Victorian era. The interwar era and more especially the 'swansong' period from 1939 to 1987 (when the last of the original Museums were closed) have yet to be examined in

the same detail. Moreover, geographically, the imperial focus has meant more attention has been given to intra-imperial networks than European or even domestic ones. Those parts of the collection originating in continental Europe or within Britain itself (the latter once contained in Museum No.4) deserve further study in their own right. A related consequence of the decision to focus detailed object studies on the more spectacular colonial objects – trophy and totem pole – means that some of the smaller, more mundane objects, such as cricket bats, walking sticks, and toys, still await their biographer.

This thesis began with certain key objectives – to analyse the Museum's networks of knowledge and exchange, to examine modes of knowledge production in and beyond the Museum, to appraise the role of space and place in the production of scientific knowledge, to investigate the process of meaning-making by visitors, and to assess the contribution made by the Museum to the field of economic botany in the long nineteenth century. These objectives have been addressed not by telling the whole story of the collection, in all its details, but rather by working on specific themes within the material, temporal, and spatial parameters defined at the outset and reiterated more briefly here. In the process, it has become clear that the Hookers' celebration of the Kew model, an example of which prefaced this conclusion, must be understood in its rhetorical context – and specifically as a self-justifying narrative which has proved remarkably influential. The methodology of object biography, combined with a broadly contextual approach to the collection as a whole, has suggested an alternative way of conceiving this history.

3. The Economic Botany Collection today

The recent history of the Museum and the EBC is, ironically, less well documented than its origins, and the interviews conducted for the research with former staff members have thus been particularly helpful in re-

constructing this phase of their existence (see Appendices I and II) . From its formation in 1847 until 1953, the Museum formed a single department, known as the Museum of Economic Botany. In 1954 this was renamed the Department of Economic Botany, acknowledging the role of the research being conducted there. But by the time Rosemary Angel joined the Department as Officer-in-Charge in 1967, it had been stripped of its research function and in 1973 was redesignated the Museums Division. It lasted thus until 1985 when it was dissolved and the collections and collections staff were subsumed into the Economic Botany and Conservation Section (ECOS), reporting to the Herbarium Division. In 1990 the Economic Botany Collection and staff were installed in the Banks Building which had been designed as a research and exhibition facility. In 1994 those staff in ECOS concerned with useful plants moved to the newly created Centre for Economic Botany with Hew Prendergast as its head, and this was a particularly dynamic period for economic botany at Kew. Research scholarships and internships were established, leading to many publications. The Collection grew as a result of collaboration with Kew botanists who contributed objects from their field trips. The Centre's life as a public space was, however, short-lived. In 1998, and as a result of a National Heritage Memorial Fund award of £1.4 million, Museum No. 1 re-opened as an education centre and display space featuring the permanent exhibition *Plants+People* (Figure 9.1). This installation, which displays approximately 500 objects from the EBC, is ethnobotanical in orientation. A small display on the history of the Collection has also been mounted, and the indigo factory model of Chapter Four has found a new home there.

In 2006 the CEB became part of what is known as the Sustainable Uses Group and moved to the Jodrell Laboratory. However, only four years later custody of the Collection was transferred to the Herbarium, Library, Art and Archives section (HLAA), in a return of sorts to William Hooker's Educational, Instructive and Scientific Department of 1860. Under the current curator, Dr.

Mark Nesbitt, the last decade has seen highly productive collaborations with university departments, especially in the fields of object conservation, history of science, anthropology, and geography. In line with developments elsewhere in the museum world, links have been built with source communities in Canada, New Zealand and elsewhere. Loans, open days and the internet are opening the Collection to new audiences; 2012 has seen the collection database go on-line for the first time. Plans for accreditation with the Museums Association are also well advanced, again with the intention of increasing awareness and attracting new funding opportunities. The Collection is currently growing at an estimated rate of 1,000 objects per year. Fairtrade products are actively collected, and plants or products which represent new or revived uses of plant raw materials, such as hemp. *Materia medica* are of particular interest, with an acquisition in 2012 from KCL of 5,500 objects which once belonged to the Chelsea College of Pharmacy, supplementing the 1983 acquisition from the Royal Pharmaceutical Society of 10,000 specimens. And since 1998 a key priority has been identified as the collection of and research into Chinese herbal medicines. The Chinese Medicinal Plants Authentication and Conservation Centre (CMPACC) has a dedicated scientific officer, and a number of articles have already been published (Leon & Lin 2009; Leon *et al.* 2009; Kite *et al.* 2009).[3] An encyclopaedic review of the field is in preparation for publication, comparable to the floras of Kew taxonomists, past and present.

The collection, whilst not on public display, is nevertheless heavily used by many groups: as a reference collection for the identification of plant specimens by botanists, and particularly by wood anatomists; by indigenous communities, such as the British-based Maori weavers group; as inspiration for artists and crafters; as teaching aids for students on Kew-based courses and on Kent

[3] See: http://www.kew.org/science/ecbot/ecbot-cmpac.html

University's MSc in ethnobotany; and by over 400 researchers each year from the sciences, arts, and humanities. Amongst these, student conservators play a vital role, not just in conserving objects but also in decoding the meanings of objects to their original makers and users. And historians of all persuasions – of science, of geography, of art and design, of empire, of museums and collections, and of environment, to name but a few – are similarly de-coding the Collection according to their varying disciplines. As they publish articles and books on their research, so the Collection circulates still.

There are also opportunities for other kinds of public engagement: museums are frequent borrowers of objects for exhibitions, and this is another way in which the Collection continues to circulate. Group tours of the store are given periodically though they are labour-intensive and their overall reach is limited by the numbers they can accommodate. There is a role for other means of reaching a mass audience. It was always an objective shared by Kew, Royal Holloway and myself that the research undertaken for this thesis might raise awareness of the extinct Museum and the extant Economic Botany Collection through the traditional channels of conferences and symposia, academic and specialist publishing (Cornish 2012a; Nesbitt & Cornish 2013), bringing to light new knowledge to further both scientific and historical understandings. In this context, it is worth noting that the research has contributed to improved cataloguing of museum archives (as described in Chapter Three) and an increased awareness within Kew of the Economic Botany photograph collection, examples of which are to be included in a forthcoming book on Kew's photographic holdings authored by curatorial staff.[4]

Beyond the research arena, there has also been a shared desire to circulate the research findings through instances of public engagement. In addition to

[4] A salient example is a photograph by Eadweard Muybridge purchased by the Museum in 1876.

making posts on the Economic Botany Blog,[5] an article based on this research has recently appeared in the *Kew Magazine* (Cornish 2012b),[6] and more are planned. In September 2011, in collaboration with the curator, I produced a temporary exhibition for the London Open House weekend based in the original Museum of Economic Botany building, with textual interpretation and opportunities for direct public engagement with the Collection (Figure 9.2). This was attended by 1,200 people over two days. Visitors demonstrated a higher than average attention to text panels and labels, and a level of questioning which demonstrated real engagement with the displays. Additionally, and in the great tradition of the Kew Museum, it proved to be an opportunity for knowledge sharing between Kew representatives and visitors. Finally, whilst this thesis was conceived formally as a contribution to the academic literature on Kew and to the study of museums in general, it is hoped that the findings may be of interest to a broader constituency. Possibilities include publication in book form, the development of a volunteer training programme, and a resource pack for tour guides working on the Collection. This would facilitate more tours of the store, and thus contribute to RBG Kew's programme of public engagement. Enhancement of the EBC web pages has also been discussed with this aim in mind.

The work presented in this thesis has by no means exhausted the possibilities for historical research on the Economic Botany Collection. For example, as noted above, the interwar and post-war phases of the Museum's history merit closer inspection, as does the involvement of the Museum specifically in British forestry. UK-based and European networks of science also represent fertile

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[5] See http://www.kew.org/news/kew-blogs/economic-botany/Reliving-Kews-Museum-of-Economic-Botany.htm;
http://www.kew.org/news/kew-blogs/economic-botany/mysterious-hanging-diagrams.htm

[6] Estimated readership: 70,000; demographic: 'mature, AB1&2'. Source: Kew Magazine Media Pack 2012. Accessed 9 October 2012 at:
http://www.kew.org/ucm/groups/public/documents/document/kppcont_058935.pdf

ground for research, especially in recent decades. Again, the relationship between the Kew Museums and the development of economic botany in the United States provides a further rich seam for investigation, covering worlds' fairs and scientific networks in the nineteenth century, as well as the shifting relationship between economic botany and ethnobotany during the twentieth. These and many other topics suggest themselves for further research. What I hope to have shown in this thesis is that while these topics may fruitfully be investigated through the collections at Kew, their limits should not be defined by Kew. The focus on object and collection biographies developed in this study effectively stretches our perspective far beyond the institution itself, and also beyond the self-justifying narratives of its founders, requiring us to focus on flows and networks between as well as within particular sites,

This, then, is where we find both the power and the limits of the 'happy Hookerian idea'. In attempting to reposition the Museum of Economic Botany on the museological map of nineteenth-century Britain – to recover a sense of its physicality, its pedagogical role, its standing amongst its contemporaries, its contribution to science – we soon find that it is located not in one place, but in many; and not solely in a physical site, but in the very practices of a discipline which Kew did so much to shape. There may be other ways of telling this story, but at least this is no longer a 'lost museum'.[7]

[7] Title of a Museums and Galleries History Group (MGHG) symposium held at the Royal College of Surgeons, 10 February 2011, at which the author presented a paper on the Museum of Economic Botany.

Figure 9.1 *Plants+People* Exhibit in former Museum No. 1 1998

Photograph by A. McRobb; KPI T-98-30 ©RBG, Kew

Figure 9.2 Open House London event September 2011 in the former Museum No. 2, now the School of Horticulture

Photograph by Mark Nesbitt

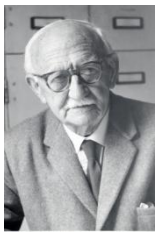
Appendices

Appendix I The Museums of Economic Botany timeline

Museum	**Opened** (Closed)	**Name changes**	**Site**	**Arrangement**
Museum of Vegetable Products 	**1847** (1959)	**Museum of Economic Botany** 1852 **Museum No. 2** 1857 **Museum No. 2** Monocotyledons & Cryptogams 1883	 Former Georgian fruit store, converted by Decimus Burton Position: **I21** on **Figure 4.6**	**1847**: 'Commercial' (dyes, tans, gums, &c.) **1855**: Systematic according to Candolle's 'natural' system **1857**: Ditto, but monocotyledons and cryptogams only **By 1881**: Systematic according to Bentham-Hooker system
Museum No. 1 	**1857** (1987)	**Museum No. 1** Dicotyledons & Gymnosperms 1883 **Museum No. 1** Dicotyledons 1907	 Designed by Decimus Burton; opposite the Palm House Position: **L19-20**	**1857**: Systematic according to de Candolle's 'natural' system (dicots and gymnosperms only) **By 1877**: Systematic according to Bentham-Hooker system
Museum No. 3 Timbers 	**1863** (1959)	**Museum No. 3** Timbers and Gymnosperms 1907	 Former orangery, designed by William Chambers, built 1761 Position: **F17**	**1863**: Geographic **1907**: Woods – geographic Gymnosperms – systematic **1927**: No longer 'strictly...geographical'
Museum No. 4 British Forestry 	**1910** (1987)	**Wood Museum** 1959	 Former cottage of Duke of Cambridge Position: **F20-21**	**1910**: Thematic (Rooms 1&2: plant specimens; Room 3: systematic; Room4: abnormalities and pests; Room 5: wood uses; Room 6: tools)

Appendix II: Directors and Museum Curators at Kew 1841-1986

Directors	Assistant Directors	**Museum Curators**	Assistant Curators
 **Sir William Jackson Hooker** Director 1841-65	**Joseph Dalton Hooker** Assistant Director 1855-65 *(Post abolished 1865)*	 **Alexander Smith** Untitled 1847-55 Curator 1856-57	
 **Sir Joseph Dalton Hooker** Director 1865-85	*(Post redesignated 'Assistant to the Director')* **William Turner Thiselton-Dyer** Assistant to the Director 1875-85	 **John Reader Jackson** Curator 1858-79 Keeper 1879-1901	**John Masters Hillier** Assistant 1879-1901
 **Sir William Turner Thiselton-Dyer** Director 1885-1905	 **Daniel Morris** Assistant to the Director 1886-98	 **John Masters Hillier** Keeper 1901-26	 **John Henry Holland** Assistant 1901-34

Directors	Assistant Directors	**Museum Curators**	Assistant Curators
			 **William Dallimore** Assistant 1908-26
 **Sir David Prain** Director 1905-22	*(Post suspended by Treasury 1898 and reinstated as 'Assistant Director' 1907)* **Arthur William Hill** Assistant Director 1907-22	**William Dallimore** Keeper 1926-36	
 **Sir Arthur William Hill** Director 1922-41		 **John Hutchinson** Keeper 1936-48	
 **Sir Geoffrey Evans** Acting Director 1941-3		 **Frank Norman Howes** Keeper 1948-53	

Directors	Assistant Directors	**Museum Curators**	Assistant Curators
 **Sir Edward James Salisbury** Director 1943-56		*(Museum of Economic Botany redesignated 'Department of Economic Botany' 1954)* **Frank Norman Howes** Keeper 1954-66	
 **Sir George Taylor** Director 1956-71	*(Post re-designated 'Deputy Director' 1959)* **John Brenan** Deputy Director 1965-1976	 **Rosemary Angel** Officer-in-Charge 1967-72	
 **John Brenan** Director 1976-81  **Ernest Bell** Director 1981-88		*(Department of Economic Botany redesignated 'Museums Division' 1973)* **Rosemary Angel** Officer-in-Charge 1973-85 *(Museums Division dissolved 1985; Museums 1 & 4 close 1987; ECOS* manages Economic Botany Collection and research)*	*ECOS: Economic and Conservation Section

Appendix III Interviews with Museum visitors and staff

A. Museum visitors

Interviewee	Museum(s) visited	Date of interview
Sally Morgan	Museums I, III, IV	14 March 2011
Mary Singham	Museum I; Wood Museum	21 March 2011*
Julia Welchman	Museum I; Wood Museum	5 April 2011
Sarah Elson	Wood Museum	7 April 2011

B. Museum staff

Interviewee	Position (former)	Date of interview
Laura Giuffrida	• Museums Assistant1973-76 • Illustrator/Graphics Officer 1977-1986	8 March 2011
Gail Bromley	• Guide Lecturer 1985-87	8 March 2011
Hew Prendergast	• Head of CEB 1994-2003	12 March 2011
Laura Ponsonby	• Assistant Guide Lecturer 1966-70 • Guide Lecturer 1970-87	19 April 2011
David Field	• Deputy Head ECOS 1986-88 • Head of ECOS 1988-94 • EBC Curator 1994-97	20 April 2011*

*Responded by mail

Appendix IV Other collections and museums of economic botany

Founded	Name	Holding Institution
1851	Gallery of Economic Botany	Government Museum, Chennai
1851	Botanical Museum*	Royal Botanic Garden, Edinburgh
1852-53	Economic Collection	National Botanic Gardens of Ireland, Glasnevin, Dublin
1858	Economic Botany Collections, Botanical Museum	Harvard University Herbaria
1860	Museum*	Missouri Botanical Garden, St. Louis
1878	Botanical Museum	Botanical Garden, Berlin
1881	Museum of Economic Botany	Botanic Garden, Adelaide
1880s	Museum of Economic Botany*	Royal Botanic Gardens, Peradeniya, Sri Lanka
1880s	Museum of Economic Botany*	University of Pennsylvania, Philadelphia
1890	Queensland Museum of Economic Botany*	Department of Agriculture, Brisbane
1891	Museum of Economic Botany	New York Botanical Garden
By 1891	Museum of Economic Botany*	Brown University, Providence
1893	Timothy C. Plowman Economic Botany Collection	Field Museum, Chicago
By 1893	Museum of Economic Botany*	Royal Botanic Gardens, Melbourne
By 1900	Museum voor Economische Botanie	Buitenzorg Botanic Garden, Java, Indonesia
1901	Economic Botany Gallery	Indian Museum, Kolkata
1912	Ethnobiology Collection	National Museum of Natural History, Paris
1932	Economic Botany Gallery	Liverpool Public Museums

Source: Nesbitt & Cornish (forthcoming) 2013 *Collection no longer extant

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DC 39 English Letters A-H (1858-1861)

DC 41 English Letters A-K (1862-1865)

DC 52 E. Indian, Chinese & Mauritius & c. Letters (1818-1831)

DC 53 E. Indian, Chinese & Mauritius & c. Letters (1832-1837)

DC 54 E. Indian, Chinese & Mauritius & c. Letters (1838-1851)

DC 55 E. Indian, Chinese & Mauritius & c. Letters (1851-1856)

DC 75 Australian and Pacific Letters (1859-1865)

DC 77 English Letters A-BAL (1866-1900)

DC 104 English Letters TUP-WAN 1857-1900

DC 112 English Letters 1901-1905

DC 139 German Letters A-K 1858-1900

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