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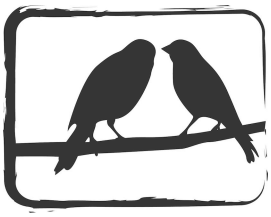

Global Plants and Digital Letters: Epistemological Implications of Digitising the Directors' Correspondence at the Royal Botanic Gardens, Kew

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ABSTRACT Digitisation is presenting new possibilities and challenges for the use of collections in both the humanities and the sciences. However, digitisation is also another layer in a longer process of selections shaping the collection—something which must be analysed on a case-by-case basis. This paper considers the epistemological implications of the digitisation of the Directors' Correspondence (DC) collection (1841-1928) at the Royal Botanic Gardens, Kew, made available through the Global Plants database. In order to avoid a polarised analysis of the end-products of archive and database, the selection process shaping this collection is traced from the writing of the letters and their reception into the DC at RBG, Kew, to the digitisation with corresponding metadata and the end-user searching the database. Particular attention is given the digitisation process and the knowledge produced by the project digitisers, as they combine close reading and database searches in writing the summaries of the letters for the metadata. This analysis of the DC engages with wider discussions about digitisation by emphasising the importance of taking a longer historical perspective, with particular attention to moments of selection, and highlighting the knowledge generated by those involved in the digitisation process. By doing so, the result is not a clear trajectory but a combination of losses and gains, disconnections and reconnections. Care is therefore needed to avoid replicating the invisible losses of extractive approaches to knowledge production, particularly in the context of collection-based biodiversity conservation.[1]

"The collection is the unique bastion against the deluge of time."[2]

Introduction

The Directors' Correspondence (DC) collection (1841-1928) at the Royal Botanic Gardens, Kew, is a rich and extensive botanical resource, particularly for the fields of taxonomy and

[1] This paper builds on my Master's dissertation, "The Challenge of Information Overload in Museum Studies: Utopia/Heterotopia as a Hermeneutical Key for Analysing the Directors' Correspondent Project at the Royal Botanic Garden, Kew" (University of Gothenburg, 2012). This research involved a three week internship writing summaries at the Directors' Correspondence Project.

[2] John Elsner and Roger Cardinal, *The Cultures of Collecting* (Cambridge, MA.: Harvard University Press, 1994), 1.

conservation science. It is also a valuable historical resource. Through the ongoing DC project, the letters are in the process of being digitised, summarised, and made available on the recently launched Global Plants database together with herbaria specimens, illustrations and other collections. While this has made the DC collection much more easily and widely accessible, approaching the correspondence through Global Plants, a database designed primarily for plant science research, raises epistemological concerns. In both the creation of botanical collections and the database, there is a displacement which makes it possible to know from a distance and discover larger patterns—a possibility which relies on accurate and relevant metadata. When faced with the question of where to draw the line between data, metadata and the irrelevant, historians and botanists have different criteria in evaluating what is most important to preserve. These epistemological questions occasioned the writing of this paper, which focuses on the digitisation process itself as a means of knowledge-making which is part of a longer selection process beginning with the writing of the letters, and which straddles the archive and the database. As such, this paper is a contribution to the growing historiographical and humanities discussions addressing the implications of the digitisation of historical sources, in this case correspondence, particularly in the context of the history of botany.

Digitisation is changing historiographical practice, and as a field traditionally reliant on archival resources, much of the scholarly analysis has addressed the epistemological and practical challenges and possibilities presented by the database and digital technology. Joshua Sternfeld considers these changes to be significant enough to constitute a new field: "Digital historiography is defined as the interdisciplinary study of the interaction of digital technology with historical practice. Three archival processes—selection, search, and the application of metadata—form the theory's foundation."[3] These developments have opened up new possibilities for correspondence networks, such as the Mapping the Republic of Letters project.[4] However, a major concern for the historian as end-user is how to apply source criticism to digital sources: the possibilities of 'distant reading'[5] or data mining are increasingly being considered alongside historiographical conventions of close reading, and the database is usually encountered as a finished and inscrutable product. Rather than a static approach to the database, considering the archive and database through the digitisation process which connects them is in many ways an extension of what has become a historiographical commonplace: the database, like the archive, is not neutral. The early modernist Michael Hunter's description of archives also holds true for databases: they are not "neutral repositories of data from which significant items can be individually garnered" but "self-contained organisms, reflecting the purposes for which they were formed and the processes to which they have been subjected."[6] When using the keyword search on a database, it is easy to be seduced

[3] Joshua Sternfeld, "Archival Theory and Digital Historiography: Selection, Search, and Metadata as Archival Processes for Assessing Historical Contextualization," *American Archivist* 74, no. 2 (2011): 544.

[4] "Mapping the Republic of Letters," accessed 19 March, 2015, http://republicofletters.stanford.edu/.

[5] Franco Moretti, *Distant Reading* (London: Verso, 2013). Moretti is a literary critic rather than a historian.

[6] Michael Hunter, "Introduction," in *Archives of the Scientific Revolution: The Formation and Exchange of Ideas in Seventeenth-Century Europe*, ed. Michael Hunter (Woodbridge: Boydell, 1998), 1.

by what Ian Milligan calls the "illusionary order" of the database, forgetting that the results are enabled by a digitisation process shaped by a number of factors, including funding, technology and the values of the institutions, organisations and individuals involved.[7] Milligan argues for the importance of transparency, in the context of accessing newspapers digitised through OCR (Optical Character Recognition, a tool designed for corporate, typed text), as the "absence of documentation on experience with either of these two databases … has important historiographical consequences for our profession and our conception of the past."[8]

In the case of the DC, the mediating role of OCR in Milligan's example is held by a digitisation team of four project digitisers in an office of the RBG, Kew Library, who create the digital images and the metadata, meticulously reading through every word, letter by letter.[9] Digitising the DC is a formidable task both in terms of the size and diversity of the collection, and nearly ten years since the digitisation began, less than half the collection has been completed. The process involves indexing the letters, producing the digital image and compiling the metadata, consisting of a caption including "the author, recipient, address, country of origin and date," and a summary of a maximum of 350 words.[10] These processes are themselves being documented and communicated through blog posts and other channels, which both provide a form of transparency and make it an ideal case study of the journey from archive to database.

The aspect that is of most interest to this paper is the metadata, especially the summary, as this has the greatest implications for interpreting the letters. Thus the project digitisers have a role as gate keepers, as the metadata is the portal through which the content of the letters is accessed, involving a process of selection which ultimately decides what content can and cannot be picked up by Global Plants search functions. Tim Hitchcock calls this the "deracination of knowledge":

> The advent of keyword searching has been fantastically liberating. But it has also resulted in the substantial deracination of knowledge, the uprooting, or 'Googlization,' of the components of what was once a coherent collection of beliefs and systems for discovering and performing taxonomies or information.[11]

This is a process of selection and loss, transplantation and reconnection. In the case of the digitisation of the DC as a botanical archive, the deracination of knowledge is not only metaphorical. Like the plant specimens which have been selected, cut, preserved and sent long distances to RBG, Kew's herbarium, the DC letters are themselves pieces of elsewhere, in many cases an elsewhere which is as different in its culture and climate as in its flora. The history of botany is a history of travel, of uprooting and transplantation, of the constant movement, exchange and adaptation of people, plants and knowledge about plants. This mobility has led

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[7] Ian Milligan, "Illusionary Order: Online Databases, Optical Character Recognition, and Canadian History, 1997–2010," *Canadian Historical Review* 94, no. 4 (2013).

[8] Milligan, "Illusionary Order," 567-68.

[9] There were four project digitisers in early 2012.

[10] Katherine Harrington, "The Digitisation of Kew's Directors' Correspondence Collection," *NatSCA News*, no. 23 (2012): 46.

[11] Tim Hitchcock, "Confronting the Digital: Or How Academic History Writing Lost the Plot," *Cultural and Social History* 10, no. 1 (2013): 14.

to an urgent need for standardisation, a universal or global language of plants, yet plants themselves are highly mutable and adaptable organisms, that hybridise, cross-breed and change morphologically if moved to a different climate. The struggle to make plants knowable—a struggle in which botanical collections have played a key role—raises epistemological questions. What is preserved, what is lost, and at what cost?

These questions become increasingly urgent given the importance of collections and taxonomy in contemporary scientific conservation practices, and the digitisation of botanical collections is part of a growing effort to stem the tide of extinctions.

> The need for access to biodiversity information in collections of natural history specimens and natural history libraries (particularly their inherent time dimension) provides the major driver to digitize the content in individual institutions and in networking the resultant distributed databases.[12]

As knowledge about what has grown where, and how this has changed over time, can be used in conservation efforts, the DC collection is a valuable source providing information about changes in plant distribution and insight into the classification of the plants in RBG, Kew's herbarium.

What happens to these concerns in a digital age in which not only botanical taxonomy and conservation but the humanities are fundamentally changing both on the level of theory and method? In this context, digital tools such as the free text search both enable connection and access on the one hand, and introduce new kinds of distance and exclusions on the other. As Marlene Manoff suggests, "[d]igital preservation might be an oxymoron. The digital both fosters and threatens the archival record."[13] Something similar could be said for conservation more generally, requiring the selection of that which is valued highly enough to protect. Thus this paper is not only concerned with epistemology, but with agnotology, in recognition of the importance of theorizing ignorance:

> Agnotology serves as a counterweight to traditional concerns for epistemology, refocusing questions about "how we know" to include questions about what we do *not* know, and why not.[14]

This paper follows the selection processes which shape the knowledge that can and cannot be made from the DC, from the writing of the letters to their digitisation and use of the database. *Figure 1* traces the letters sent to RBG, Kew, where they were bound in the DC collection at the Library, Art & Archives (LAA), and over a century later conserved, digitised and uploaded to the Global Plants database. Rather than simply compare the shift from archive to database, this

[12] Benjamin R. Clark *et al*., "Taxonomy as an Escience," *Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences* 367, no. 1890 (2009): 955.

[13] Marlene Manoff, "Archive and Database as Metaphor: Theorizing the Historical Record,"*Portal: Libraries and the Academy* 10, no. 4 (2010): 395.

[14] Londa Schiebinger, "Feminist History of Colonial Science," *Hypatia* 19, no. 1 (2004): 237. See also Robert N. Proctor and Londa Schiebinger, *Agnotology: The Making and Unmaking of Ignorance* (Stanford, California: Stanford University Press, 2008).

paper considers the elements shaping what can or cannot be known through the digitisation and the database, beginning with the writing of the letters to RBG, Kew as part of an extensive imperial botanical network, and an account of the organisation of the letters upon arrival at RBG, Kew. The other factor shaping the digitisation is the botanical organisation of the Global Plants database itself. In this context, the digitisation process itself is analysed as a particular site of knowledge production, followed by a discussion of the epistemological implications this process has for knowing from a distance in a digital age. This paper deals with the challenge, yet necessity, of how to situate knowledge in the context of digitisation, arguing for an expansion of the concept of database to include the selection processes which have formed it. Through this approach, the history of botanical collections, transportation, correspondence and classification offers a language to talk about the database not as a static object, but as a process involving changes, losses and exclusions as well as preservation, reconnection and access.

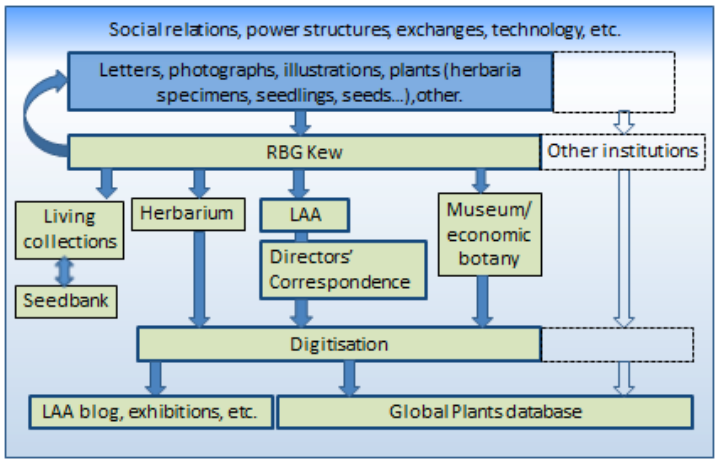

Figure 1. *The selection process from the writing of the letters to their digitisation (LAA is the acronym for Library, Art and Archives). Figure by author.*

A letter

On 12 August 1889, Nicholas Ridley, the Superintendent of the Royal Botanic Garden in Singapore, wrote to his botanical counterpart Sir William Turner Thistleton-Dyer, Director of the Royal Botanic Gardens at RBG, Kew:

> Nothing gives me more pleasure than the idea that when wearily drying one's plants in an evening after a long and hard day's jungle work, that perhaps one or two may be deemed worthy of acceptance and enshrinement in the cabinets of the Kew herbarium.[15]

This brief passage gives an insight into the DC collection as a 19th century botanical archive, and is a good example of the difference between encountering a letter through the archive, through the digitisation process and through the database. I came across this passage during a three-week internship with the DC project (Feb 2012), spent reading through and summarising letters as part of the generation of metadata. Firstly, this letter presented particular challenges

[15] Letter from Henry Nicholas Ridley to Sir William Thiselton-Dyer, 12 August 1889, accessed 22 March 2015, https://plants.jstor.org/stable/10.5555/al.ap.visual.kdcas6633.

when it came to summarising: it is not only a long letter, but one full of rich descriptions and sarcastic passages which made it both difficult to compress (what should be left out) and raised questions about how to write it (in particular, how to handle irony). For practical purposes, as the summary is accessed through a keyword search on the database, proper nouns (plants, people, places) are prioritised, and the passage quoted above has few such words that stand out. With further summarising by digitisation team leader Helen Hartley, this passage is compressed to a short phrase in the summary (underlined):

> He discusses the lack of herbarium collections in RGB Kew, Sir Joseph Hooker and Sir Joseph Banks collections excepted, and comments on the theoretical knowledge of collecting at Kew by staff who have never left England. He describes the challenges of collecting, as in the case of the Reverend W. E. Taylor, taken hostage by the king who murdered Bishop Hannington.[16]

However, the selection process deciding what can be gleaned from the letters began much earlier than the digitisation process or even earlier than the collection of the archive at RBG, Kew: when Ridley, weighing his words, picked up his pen, he did so within a complex web of relations and exchanges that shaped what he decided to include. The diversity of the DC reflects a wide range of correspondents; what was said and how, but also what was left unsaid, was determined within each correspondent's situation and relationship to RBG, Kew. Ridley wrote in the familiarity of friendship, allowing him to use irony without fear of misunderstanding or offence. This irony also expresses the distance between Ridley's world and RBG, Kew, a distance which is not only geographical. The hard work and active verbs of production contrast with the passivity of their acceptance, which nonetheless is highly selective. Of all the plants Ridley painstakingly collects, preserves and sends—assuming they arrive safely—only one or two may be accepted. (Ridley wrote this letter in the monsoon season, having just described how it made the business of collecting and drying plant specimens particularly arduous.) The movement from jungle to the herbarium cabinets is from a living place to a place of enshrinement; shrines house the dead, not the living. Thus this distance translates to loss, even in a process of preservation.

[16] Letter from Henry Nicholas Ridley to Sir William Thiselton-Dyer, 1889.

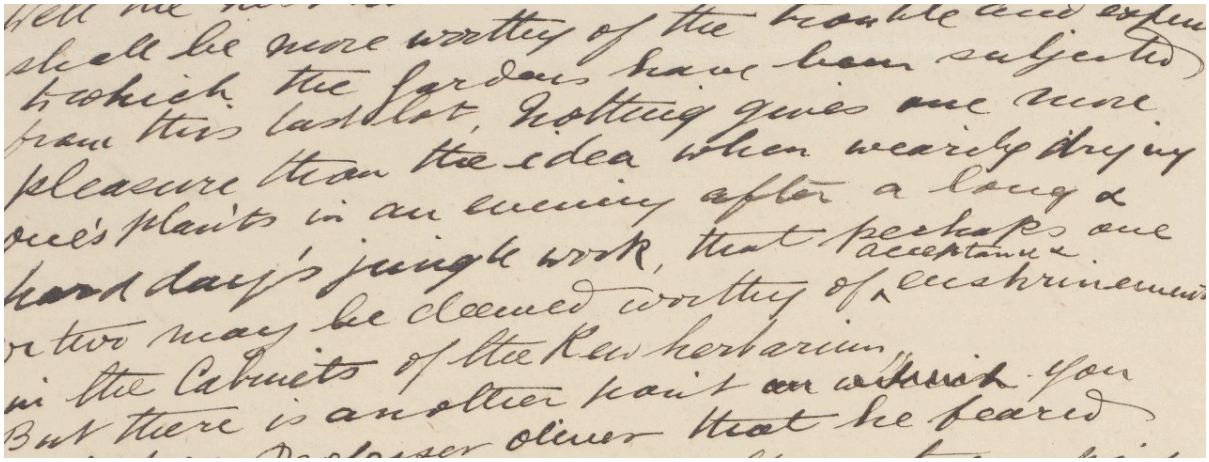

Figure 2. *Letter from Henry Nicholas Ridley to Sir William Thiselton-Dyer, 12 August 1889. Courtesy of Royal Botanic Gardens, Kew: Library, Art and Archives.*

The Network

Correspondence was essential to upholding the botanical network which was both the scientific and economic lifeline of imperial botany. The DC is in content and organisation a distinctly botanical archive, the creation of which in the 19th and early 20th century is bound up with the lives of the directors of RBG, Kew during its growth as a scientific institution, inseparable from the professionalisation of botany and the emergence of the British Empire.[17] This global botany was inextricably linked to the economic importance of RBG, Kew in identifying, stabilising and promoting plant-based resources across the Empire.[18] This was enabled by the development of cheaper and faster transportation, as well as conservation technologies such as the Wardian case, a miniature green-house in which living plants could be transported with a much higher chance of survival than previously. This created what Gavin Bridge has called '*distanciated resource geographies*'—simultaneously local and global, here and there.[19] As a collection that is both global and shaped by the local institutional concerns of

[17] Jim Endersby's work is of most relevance here, particularly on Joseph Hooker and botanical correspondence, but also through his involvement in several projects at RBG, Kew, including the Joseph Hooker Correspondence Project (the digitisation of Hooker's correspondence). The role of botanic gardens in the British Empire has been the focus of a growing body of scholarship since the 1970s. See for instance Lucile Brockway, *Science and Colonial Expansion: The Role of the British Royal Botanic Gardens* (2002), Donal P. McCracken, *Gardens of Empire: Botanical Institutions of the Victorian British Empire* (London: Leicester University Press, 1997). For a more detailed history of RBG, Kew, see Ray Desmond and Ghillean Prance, *Kew : The History of the Royal Botanic Gardens* (London: Harvill, 1995).

[18] The DC coincides with what Edward Barbier refers to as "the Golden Age of Resource-Based Development," driven by cheaper and faster transportation and expanding cropland. Edward Barbier, "The Golden Age of Resource-Based Development (from 1870 to 1914)," in *Scarcity and Frontiers : How Economies Have Developed through Natural Resource Exploitation* (Cambridge: UK Cambridge University Press, 2011). However, whatever the immediate economic benefits, this involved extensive destruction of habitats and loss of biodiversity.

[19] Gavin Bridge, "Exploiting: Power, Colonialism and Resource Economies," in *Companion Encyclopedia of Geography: The Environment and Humankind*, ed. Ian Douglas, Richard Huggett, and Mike Robinson (London: Routledge, 1996), 861.

RBG, Kew, the DC raises challenging epistemological questions about where and how knowledge is constituted within botanical networks—questions which are important to consider in relation to digitisation as a selection process. As products of empire, collections such as those at RBG, Kew are an important yet problematic source for the history of science (including botany), colonialism and empire.

RBG, Kew flourished as a scientific hub under the influence of Sir Joseph Banks into the early 19th century, but its future as a scientific institution became established under the Hooker dynasty: Sir William Jackson Hooker, Sir Joseph Dalton Hooker and his son-in-law Sir William Turner Thistleton-Dyer.[20] Jim Endersby's seminal account of Joseph Hooker and imperial botany emphasises the importance of the personal networks the directors built up and maintained, and to which the DC is a testament. There was a very human dimension to these networks: Joseph Hooker's own extensive travels deeply impressed upon him the loneliness of a colonial botanist and the importance of forming and maintaining relationships along the way.

In this way, the correspondence acts as a bridge between the official world of the institution and the local perspectives of the individual, illustrating the importance of personal relationships in shaping knowledge formation. A series of letters from Henry Fletcher Hance[21] (then vice-consul at Whampoa, China) to Hooker concerns their respectfully differing views on the theory of evolution, "a subject which people willingly avoid at home—where there is often so much narrowness, and impatience of contradiction or opposition; and particularly that you should say that you would only have done so to me 'as a private friend after my candid letter.'"[22] Hance acknowledged the explanatory power of Darwin's theory in accounting for the adaptability of plants, unlike earlier taxonomical systems which treated species as stable categories. He considered the theory to be "almost unassailable, if it is kept with certain limits," but if applied universally, would logically do away with the existence of the soul—a position he did not feel he could accept.

The problem of how to apply evolutionary theory also fueled debate within the limits of botany between the "lumpers and "splitters"—a debate in which Joseph Hooker was a prominent participant. Hooker insistently and persistently prioritised global over the local taxonomies. Like his friend Charles Darwin, he was interested in the distribution of species, particularly geographically isolated floras of for instance mountains and islands, and belonged to the "lumpers" of species rather than the "splitters."[23] As a "lumper," Hooker believed local classification systems tended to mistake varieties for species, and that a global approach was necessary. As he wrote to Darwin about his evolutionary theory, "I can't think that your case will be established upon any but such evidence as is afforded by plants spread over the whole

[20] The years covered by the DC also include Sir David Prain (1906-1922) and Sir Arthur Hill's (1922-1941) years in office.

[21] Helen Hartley pointed these letters out to me—I would not have known to look for them. This is another example of how the DC team provides access using their accumulated knowledge of the letters.

[22] Letter from Henry Fletcher Hance to Sir Joseph Dalton Hooker, 21 June 1869, Directors' Correspondence Collection, http://plants.jstor.org/visual/kdcas4172 accessed 3 September 2012.

[23] Endersby explores this further in Jim Endersby, "Lumpers and Splitters: Darwin, Hooker, and the Search for Order," *Science* 326, no. 5959 (2009).

globe."[24] However, lumping species was also a question of Hooker asserting botanical authority, centred on the RBG, Kew herbarium and disseminated through publication, while preventing species inflation by rejecting the many suggestions of newly discovered species based on local field encounters.[25] As Endersby emphasises, the letters chart a two-way exchange, a "bartering" by which both correspondents had something to gain or lose.[26]

In many ways, the inflow of letters reflects RBG, Kew's role as a Latourian cycle and centre of calculation.[27] This understanding is particularly useful for explaining the role of the DC in allowing RBG, Kew to exert control from a distance, emerging as a botanical centre through meticulous administrative and archival practices. For instance, David Miller's application of this model to Banks as a metropolitan scientific authority allows him to analyse "a spectrum of activity, not a dichotomy" between collectors at the periphery and classifiers at the centre.[28] From this perspective, the struggle of correspondents like Ridley to collect, mount and preserve plants for "acceptance and enshrinement in the cabinets of the Kew herbarium" can be understood as the production of "immutable mobiles" that "make distant parts mobile, stable and combinable."[29] The need for mobility had a very practical dimension: the letters clearly reflect the struggle and care involved in collecting plants in a special portable container called a vasculum and pressing them in a plant press for the herbarium, or propagating seeds and seedlings sent in carefully prepared Wardian cases. In order to be able to combine the plants sent to RBG, Kew's herbaria, from all over the world, into a global classification system, the standardisation and immutability of the specimens was essential, both in the selection and mounting of the plant material, and in the information included on the labels.[30] However, this standardisation involves a loss of localised information, which the correspondence helps to compensate for—in effect, the correspondence contributes to the mobility of the plant specimens, while describing the processes through which these immutable mobiles were produced. Endersby has applied Latour's cycle of circulation in a detailed analysis of the correspondence between Joseph Hooker and two Australasian correspondents, illustrating both

[24] Sir Joseph Dalton Hooker to Charles Darwin, 6 December, 1857, Darwin Correspondence Database, http://www.darwinproject.ac.uk/entry-2181 accessed 22 March 2015.

[25] Jim Endersby, "'From Having No Herbarium.' Local Knowledge Versus Metropolitan Expertise: Joseph Hooker's Australasian Correspondence with William Colenso and Ronald Gunn," *Pacific Science* 55, no. 4 (2001). Endersby describes the resistance to Hooker's authority in his correspondence with the New Zealand missionary William Colenso, whose local knowledge of botany, geography and Maori culture was not recognised by RBG, Kew.

[26] Jim Endersby, *Imperial Nature: Joseph Hooker and the Practices of Victorian Science* (Chicago: University of Chicago Press, 2008), 94.

[27] Bruno Latour, "Centers of Calculation," in *Science in Action: How to Follow Scientists and Engineers through Society* (Cambridge, Mass.: Harvard Univ. Press, 1987).

[28] David Philip Miller, "Joseph Banks, Empire, and 'Centres of Calculation' in Late Hanoverian London," in *Visions of Empire: Voyages, Botany, and Representations of Nature*, ed. David Philip Miller and Peter Hanns Reill (Cambridge: Cambridge Univ. Press, 1996), 24.

[29] Ibid. See Latour, "Centers of Calculation."

[30] Endersby, *Imperial Nature*, chapter 2: "Collecting."

the model's usefulness and limitations in this context.[31] He argues for attention to multiple cycles and centres,[32] and "individual actors' motives and intentions":

> Uncovering and analyzing colonial actors' stories can help us see how their ambitions, their stubbornness, and their loneliness were as important as their taxonomic and collecting practices in shaping the history of nineteenth-century botany.[33]

The correspondence is an important source for these stories.

Adopting the centre of calculation as an analytical model to explain the role of institutions such as RBG, Kew has also been criticised for reinforcing normative conceptions of the history of science as a peculiarly Western phenomenon, leading Kapil Raj to argue for attending to mutability rather than immutability in networks of exchange.[34] This mutability is more visible in the DC than in the herbarium (although a great many plant specimens either never made it to RBG, Kew or were not selected for "enshrinement"). On one level, the fact that the DC collection only contains letters sent to RBG, Kew—it is, in effect, only half a conversation—enforces the position of the institution as a centre. However, at the same time, the letters are sites of negotiation and resistance, reflecting a messy, complex, multi-centred network in which many wills and many lives meet. The letters resist easy generalisation, written by a great variety of correspondents, each of which has their own reasons for writing and their own relationship to Kew. This is reflected in the content and style of the letters. Thus botanical networks struggled to ensure the correct identification of species in the metropolitan centre, yet could also fail for a range of reasons.[35] Information could be suppressed or lost. Plants died. Conflicts arose between individuals and communities. In this way, the DC is an important source for a more nuanced analysis of the emergence of botany in the 19th and early 20th centuries.

However, the collection is also a witness to exclusion, and there are some stories it cannot tell and some voices which remain silent.[36] The letters are written within hegemonic

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[31] Endersby, "'From Having No Herbarium'"

[32] This point is emphasised by Lucile Brockway: "The satellite gardens in the colonies provided the system with multiple centres of research, a point I consider important … The size of the botanical network, coupled with the flexibility and informality of its operations, allowed duplication of research effort, which was an asset …" Brockway, *Science and Colonial Expansion*, 189.

[33] Endersby, "'From Having No Herbarium,'" 356.

[34] Kapil Raj, *Relocating Modern Science: Circulation and the Construction of Knowledge in South Asia and Europe, 1650-1900* (Basingstoke: Palgrave Macmillan, 2007), 20-21.

[35] This held potential problems for the empirical scientist, which Simon Schaffer has called the poisoner's dilemma. For centuries, botanists in Europe tried to establish the exact identity of the poisonwood tree, whose sap coated the deadly spearheads which had killed so many Dutch. The poisoner's dilemma was the following: if a specimen purported to be of the poisonwood tree arrived in Europe but was not poisonous, was it the wrong species (had they been duped?), or had it lost its potency on the journey? Simon Schaffer, "The Poisoner's Dilemma: On Taxonomy's Worldly Politics" (lecture, Uppsala University, Sweden, September 2, 2013).

[36] As Terry Cook and Joan M. Schwartz argue, 19th century historians and archivists were fact-hunters as much as their contemporary botanists were, enforcing these hegemonic structures. "Archives, since

structures, in which the correspondents participate. They are almost all by white males—exceptions tend to be financially independent, such as the artist Marianne North,[37] and/or of high social status, such as Visakham Thirunal Rama Varma, who between 1880 and 1885 ruled the southern Indian kingdom of Travancore. The botanical literature often attributes the discovery of a new species to the correspondent who sends it, but letters reveal the central role of local or subordinate collectors who often remain nameless.[38] The correspondents' selection of what to write and what to leave unsaid is constantly negotiated along a fine line between the private and professional, to the extent that, as Endersby argues, the two cannot be separated.[39] The problem of exclusion, whether of people or data, has led to numerous studies that shift the geographic focus from European metropolitan centres such as RBG, Kew to other sites of knowledge production, such as Savithri Preetha Nair's analysis of Raja Serfoji II of Tanjore, India as a centre of calculation that is explicitly non-European.[40]

While much scholarship focuses on tracing the knowledge that does circulate, another approach has been to focus on the exclusions themselves. Londa Schiebinger's account of the non-transmission of the abortifacient properties of the "peacock flower" or *flos pavonis,* used by pregnant slaves, is an example of agnotology in a botanical context. The botanical information was purposefully obscured because it threated colonial and male hegemonic structures.[41]

> As the case of the *flos pavonis* shows, gender politics lent recognizable contours not to a distinctive body of knowledge but to a distinctive body of ignorance. The same forces feeding the explosion of knowledge generally associated with the scientific revolution and global expansion led to the implosion of knowledge of herbal abortifacients.[42]

Thus there were also mutable non-mobiles shaping botanical knowledge, an important reminder of the limits of the knowledge that can be gained from the DC. On the one hand, this correspondence collection challenges a simple narrative of RBG, Kew as a powerful scientific metropolitan centre imposing its hegemonic structures through the inevitable extension of

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their very origins in the ancient world, have systemically excluded records about or by women from their holdings and, as institutions, have been willing agents in the creation of patriarchy by supporting those in power against the marginalized." Terry Cook and Joan M. Schwartz, "Archives, Records, and Power: From (Postmodern) Theory to (Archival) Performance," *Archival Science* 2, no. 3-4 (2002): 16.

[37] Marianne North (1830-1890) was a prolific artist who travelled extensively in the British Empire, and established the Marianne North Gallery at RBG, Kew in 1882 to house her work and make it available to the public.

[38] Endersby, *Imperial Nature*, 106. Endersby notes that if given a name, such collectors are often referred to using a nickname.

[39] Endersby, *Imperial Nature*, passim.

[40] Savithri Preetha Nair, "Native Collecting and Natural Knowledge (1798–1832): Raja Serfoji Ii of Tanjore as 'Centre of Calculation,'" *Journal of the Royal Asiatic Society* 15, no. 3 (2005). See also Anna Winterbottom, "Medicine and Botany in the Making of Madras, 1680-1720," in *The East India Company and the Natural World*, ed. Vinita Damodaran, Anna Winterbottom, and Alan Lester (Palgrave Macmillan, 2014).

[41] Schiebinger, "Feminist History of Colonial Science," 237.

[42] Ibid., 247-48.

empire, offering a rather inclusive view of botany at the time, as a multifaceted and contested endeavour undertaken by many minds and many hands in many places. On the other hand, the performativity of the letters involved exclusions which continue to shape our knowledge and ignorance of imperial botany.

The DC collection

The botanical context of the writing of the letters also shaped the organisation of the archive, which was important in enabling the combinability of the information they contain. Upon arrival at RBG, Kew, selected letters were bound into volumes which over the span of nearly a century grew to a number of 218, containing over 28,000 letters.[43] It is one of RBG, Kew's largest archival collections. The volume format reflects the value of the letters, as worth preserving, and has several implications for the digitisation process addressed in the following section. Binding the letters in volumes contributed to the stability of the collection, whose organisation is contemporary to the writing of the letters and has not been rearranged or added to since.

To begin with a practical consideration, the volumes spelled disaster from a conservation point of view, as the range of letters created a destructive chemical cocktail of papers and inks. Equally, the whole volume had to be handled in order to consult one letter, which increased the wear and tear, but on the conceptual level ensured that the letters were read not in isolation but as part of an ongoing conversation. Before the digitisation began, the letters were removed from the bound volumes, conserved and rehoused in fascicules, though still labelled according to volume. This was crucial in facilitating the digitisation, allowing each page to be photographed flat and in full without disappearing into the binding.

The volumes are also important in terms of the organisation of the letters. The DC is not an exhaustive collection. There was clearly an element of selection involved, as the archives contain many other letters, for instance in the Personal Papers.[44] Most obviously, as mentioned earlier the DC only contains correspondence *to* RBG, Kew, not the replies. The letters were bound geographically, mostly by continent of origin, with letters from the same correspondent collected in chronological order. This geographic organisation is unusual for an archive,[45] and correspondence in particular tends to be collected on a biographical basis, bringing together available letters to and from an individual as the Darwin Correspondence Project does. However, in this context it makes sense in following the geographical organisation of the herbarium. While the DC contains letters from all over the world, nearly half are English in origin, and these have not yet been digitised.

[43] This includes other items such as newspaper cuttings.

[44] The division between the collections appears somewhat arbitrary, however, as some personal letters were bound with the DC, and vice versa.

[45] Rachel Mason Dentinger, "Men of Letters," *Kew Magazine* Spring (2012): 59.

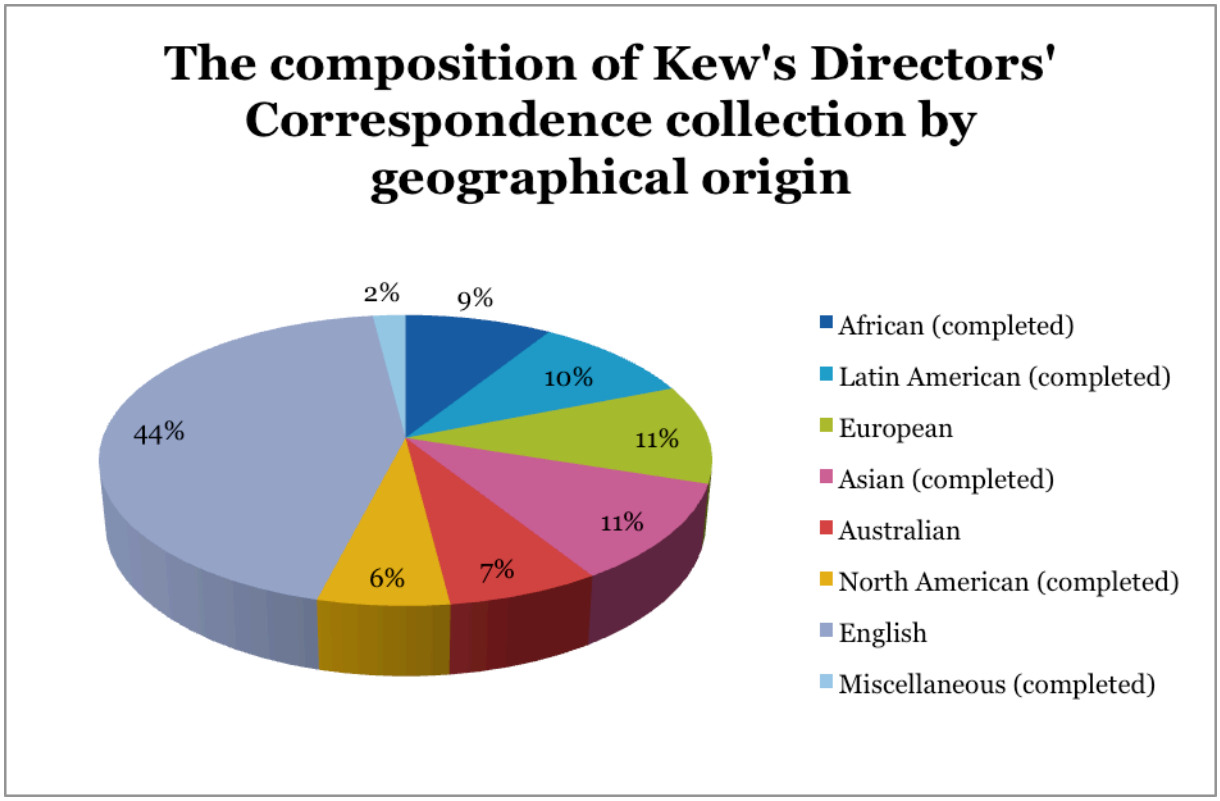

Figure 3. *The composition of RBG, Kew's Directors' Correspondence collection by geographical origin.*[46] *Courtesy of Royal Botanic Gardens, Kew: Library, Art and Archives.*

The temporal limits of the collection are also in part decided by the volume format. In 1928, there was a shift in archival practice after which the letters were stored in boxes rather than bound. This marks the temporal limit of the collection. The volumes also follow the material limits of the collection. The herbarium is one of a number of collections that are closely connected to the DC, reflecting a process of dispersal in the ordering of the letters. Correspondents sent all sorts of other material with their letters, including dried plant specimens, seeds, photographs, illustrations and objects for the museum (now the economic botany collection). The occasional drawing or photograph remains in the DC, but most of this material has ended up in other collections.

During the creation of the archive, there appears to have been a certain tension between the standardising effect of the volumes and the diversity of the letters, which were written on all sorts of paper of different qualities and dimensions. Letters were easier to preserve if all of a similar size. Small notes or cuttings had to be glued onto tabs, and large sheets were folded. Ridley repeatedly apologised for not using the requested size of paper, suggesting that at least some of the correspondents wrote with an awareness that they were contributing to a bound collection. Due to the expense of paper, many wrote in a very small hand, or cross-wrote.[47]

[46] Diagram provided by Helen Hartley (personal communication).

[47] Harrington, "The Digitisation of Kew's Directors' Correspondence Collection."

Digital Botany and the Global Plants Database

Apart from the history and organisation of the archive, the other main factor shaping the digitisation of the DC is the Global Plants database. Global Plants (www.plants.jstor.org), previously JSTOR Plant Science, was launched by JSTOR and the Global Plants Initiative in May 2013. The database brings together a range of collections from institutions all over the world, with RBG, Kew as a significant contributor. The main focus has been on digitising herbaria collections, but part of the strength of the database is in bringing together plant specimens with other kinds of collections such as correspondence, notably the DC, illustrations, photographs, economic botany objects and publications. Thus the database reconnects material split up into separate collections upon arrival at RBG, Kew. These can be accessed through a simple keyword search under Names, Names with Synonyms, Places, People or Free Text, and further refined through Resource Type, Geography, Herbarium or Collection. If there are any letters in a search from the DC, they can be accessed directly under 'Collection.' There is an alternative search function, the 'advanced search' which allows detailed specification such as the date and place of the collection of a specimen *(figure 5)*. The results can then be ordered according to different criteria, such as taxonomy or date. Each digitised item contains metadata and a thumbnail of the digital image *(figure 6)*, accessible to anyone, which participating institutions can access in high resolution. It also has a zoom function for more detailed study.[48] As well as providing access to the digitised material, the database also allows the user to create an account in which to save material, and to communicate with others forming an online community.

Figure 4. *Distribution of Global Plants Partners. Courtesy of Global Plants/JSTOR.*

In some ways this online global botanical community is very different from 19th and early 20th century botanical networks. Digital technology and the Internet are fundamentally changing botanical practice, generating intense debate in areas such as taxonomy, and hope for more

[48] The microscope filled a similar function in the study of the herbaria sent to RBG, Kew.

efficient biodiversity conservation in the face of climate change. There is an urgency to digitise as much material as possible as efficiently as possible. RBG, Kew is at the forefront of this science-based conservation, with its unparalleled collections, global connections and many years of experience. Thus, despite changes on the scientific level, the collection is still a key catalyst and meeting place. As we have seen, the DC has had close ties with the production of a distinctly *global* botany, a contested process in which standardisation and various 'metadata' were essential. The fact that the DC is being digitised suggests its continued importance (if not for the same reasons that the letters were initially written and preserved), within the wider context of a digital turn in botany. The digitisation of natural history collections (including botanical ones) opens up greater possibilities for taxonomists in particular to process vast quantities of material, thanks to the combinability of the metadata. Testifying to the attention digitisation and the database in particular have received from the plant science community, Global Plants has been hailed as "one of the most profoundly useful and influential projects launched in plant systematics over the past two decades."[49] This is partly because of its global scope in a time of "global change."[50] It has proved a source of inspiration for the possibilities of global digitisation:

> … the creation of a global virtual collection is not only possible, but … will greatly facilitate our ways of understanding biodiversity by utilizing the enormous potential that is slumbering in our natural history collections worldwide.[51]

However, while this global scope is reminiscent of the global botanical networks reflected in the DC, it marks a shift away from a clearly centralised endeavour, with authority concentrated in a few institutions such as RBG, Kew, towards global access and a "global exercise":

> taxonomy is rightly moving from an activity purely carried out in developed countries to a global exercise. This is particularly appropriate as most biodiversity hotspots are in the developing world. … But many taxonomists in the developing world frequently lack access to the library facilities that enable them to navigate fully the fragmented taxonomy of a group.[52]

This "global exercise" is often discussed in terms of repatriation. However, access to Global Plants is limited by its being a subscription database, so that while the metadata is available freely worldwide, the digitised images themselves are largely restricted to paying institutions. The database has started the "Champion" funding project to help smaller herbaria gain access: "Give an herbarium in a developing nation access to the world's largest digitised collection of

[49] Gideon F. Smith and Estrela Figueiredo, "Type Specimens Online: What Is Available, What Is Not, and How to Proceed; Reflections Based on an Analysis of the Images of Type Specimens of Southern African Polygala (Polygalaceae) Accessible on the Worldwide Web," *Taxon* 62, no. 4 (2013): 801.

[50] H. C. J. Godfray *et al.*, "The Web and the Structure of Taxonomy," *Systematic Biology* 56, no. 6 (2007): 944.

[51] Michael Balke *et al.*, "Biodiversity into Your Hands—a Call for a Virtual Global Natural History 'Metacollection,'" *Frontiers in Zoology* 10, no. 1 (2013).

[52] Godfray *et al.*, "The Web and the Structure of Taxonomy," 945.

plants."[53] On another level, the use of repatriation to describe sharing digitised images is in itself optimistic and problematic, as the originals (including many type specimens) remain in the institution.[54] Botanists Estrela Figueiredo and Gideon Smith argue that the concentration in European herbaria of botanical collections, particularly type specimens, collected in former colonies continues to constrain the development of botany in these countries. While acknowledging the value of digital repatriation through projects such as Aluka (a forerunner of Global Plants), it does not replace access to the original. Like William Colenso's argument to Hooker prioritising local field botany of living plants, Figueiredo and Smith's call for the repatriation of herbaria reflects their conclusion that *in situ* botany produces better science:

> It must also be emphasised that there is a difference between a Flora produced locally and one produced *ex situ* by taxonomists who know the plants as herbarium specimens but often never saw them in the wild. Even though these 'armchair botanists' may be extremely competent, when the knowledge of a plant species is based only on preserved and colourless, two-dimensional specimens trimmed to fit herbarium sheets, it is probable that several obvious characters of that species are ignored.[55]

[53] "Global Plants Database," (JSTOR, 2015).

[54] Ultimately, it is important to remember that from the collecting and mounting to the naming of the plant, the herbarium specimen is an imperial botanical artifact, which actively suppressed or extracted Indigenous knowledge and languages. This raises the deeper concern about whether a continued use of colonial collections, treated indiscriminately as neutral repositories of botanical information, could inadvertently replicate exploitation and other unequal relations of empire.

[55] Estrela Figueiredo and Gideon F. Smith, "The Colonial Legacy in African Plant Taxonomy," *South African Journal of Science* 106, no. 3-4 (2010).

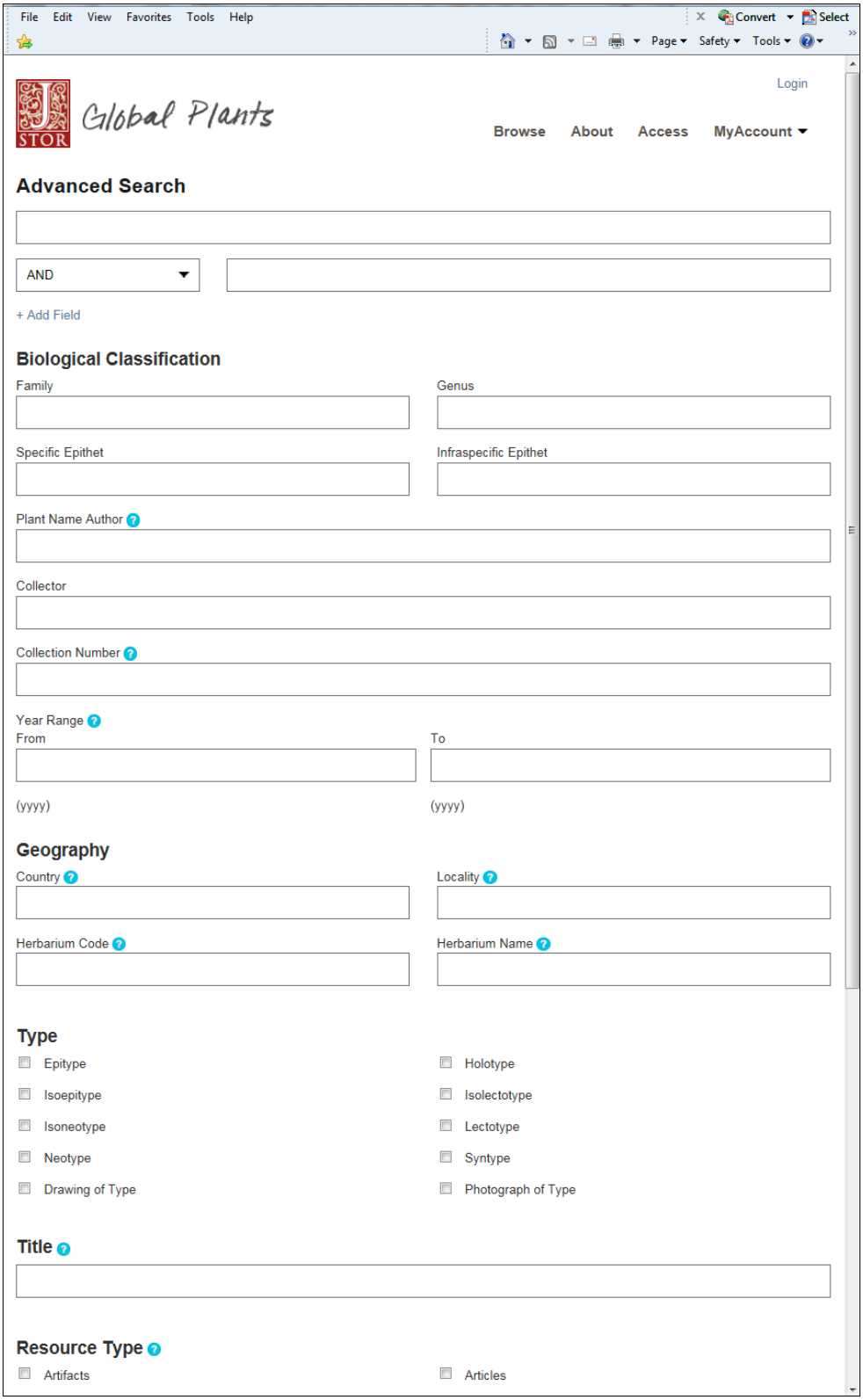

Figure 5. *Global Plants advanced search function. Courtesy of Global Plants/JSTOR.*

Figure 6. *Global Plants metadata. Courtesy of Global Plants/JSTOR.*

The Digitisation Process

The digitisation team have a dual role, acting as gate keepers in producing summaries of the letters for the database, while also generating new knowledge. Thus the epistemological implications of digitising the DC need to be considered on several levels: the metadata, in particular the summaries, in shaping end-users' access to the letters; the project digitisers writing the summaries as a privileged form of knowledge production with access to both the archive and the database; and the channels, other than the database, which are used to communicate the knowledge generated through the digitisation process.

The main selection process involved in the digitisation of the DC for the Global Plants database is in producing the metadata, particularly writing the letter summaries. From the perspective of the online user, the summaries both enable access, shape it and involve an element of exclusion. The decision to use this particular combination of metadata (*figure 6)* reflects the size and diversity of the letters described above, as well as the botanical context. In contrast, the Darwin Correspondence Database is biographical, bringing together letters from different collections, including the DC, in order to provide a comprehensive resource. This is closer to the edited volumes of correspondence which have been conventional tools for historians, including footnotes to each letter, a bibliography and a glossary of scientific terms. The Darwin Correspondence Database and the newly launched Joseph Hooker Correspondence Project include both a summary and transcription of each letter, so that the entire contents can be accessed in a free text search.[56] Considering the size of the DC collection, however, this approach would take too long. Another option would be to only include the caption, which would provide more points of entry than through the bound volumes. As Katherine Harrington notes, "Prior to this project the DC was indexed only by author, making it somewhat more impenetrable for research."[57] Although limiting the metadata to a caption would speed up the process considerably, it would greatly limit the scope of the search function.

The summaries both provide a much more detailed base for free text searches, but also provides users with a brief overview to ascertain whether the letter is of relevance for closer study. The summaries are also particularly important in terms of access because while the metadata and a thumbnail of the image are freely accessible to anyone with an internet connection, viewing the digitised letter itself requires a subscription. So for many, access to the content of the letters is limited to the summaries. Even for those who have access and take the time to read a letter in its entirety, it is reasonable to suppose that the summary would act as a lens/reinforce the prioritisation of certain aspects of the letter.

The degree of epistemological impact of the summary depends on the length of the letter. A short letter can in effect be transcribed. The longer the letter, however, the greater the exclusion, and the more significant the role of interpretation becomes. The principle of inclusion reflects the practical function of the summaries, which need to contain the words that are most likely to be searched: "recording the key points such as people names, plant names, locations, and publication."[58] This necessarily privileges nouns, especially proper nouns, over

[56] The Joseph Hooker Correspondence Project is currently in a pilot phase, so that although the transcriptions are available for download, the free text search as yet only picks up the summary.

[57] Harrington, "The Digitisation of Kew's Directors' Correspondence Collection," 44.

[58] Harrington, "The Digitisation of Kew's Directors' Correspondence Collection," 46.

descriptive language. In the longer letters, however, it is not possible to include all the key words. At this point it is up to the discretion of the digitisation officer to prioritise certain aspects, informed by their specialised knowledge of the collection. Word choice is another factor, as the user may not enter the same word in the search field that occurs in the summary.

The summaries raise not only the question of what is lost in quantitative terms, but also in ways which are harder to establish but more pervasive. Each correspondent has a unique style, just as they have their own handwriting, and there is great variation in tone between the letters. This reflects all sorts of emotion, from anxiety and anger to excitement and affection. These are often heightened under the pressures of colonial botany, with its particular frustrations and triumphs (for instance lack of access to botanical publications, plants dying under transport, feuds and loyalties between botanists, and the sheer joy of discovering a particularly beautiful or unusual plant), and the personal pressures of living and travelling abroad, security issues, disease and separation from loved ones. The summaries often include short phrases from the original, in citation marks, that reflect the correspondents' particular way of expressing himself, such as calling a garden committee member a "'dear old muddling fathead' of a merchant,"[59] or clarify that words such as "coolie" and "natives" are those of the correspondents. Some correspondents adopt a formal tone and style, as appropriate to the official function of the recipient as representative of RBG, Kew. Their letters tend to be more literal and so require little interpretation. In contrast, some of the more informal letters cannot be taken at face value in order to be understood, as in Ridley's letter discussed above. Irony requires interpretation, as the meaning is in opposition to a literal reading of the words themselves.

The digitisation is both a solitary job and a team effort—the letters are read individually, but sharing an office enables informal exchanges ranging from a second opinion on illegible words to shared anecdotes. This is especially true of conflicts between correspondents, revealing different accounts of the same story. A good example is letters from Cuthbert Collingwood and Captain John William Reed relating a dispute between them when the former was a gentleman naturalist on the *H.M.S. Rifleman*.[60] Collingwood later published an account of his journey, in which he not only avoided writing about the dispute, but completely eliminated Reed from the narrative. The Darwin Correspondence Project suggests in a footnote to Collingwood's letter to Darwin before departure that Collingwood never travelled with Reed, on the basis of *Rambles of a Naturalist*.[61] This provides an example of the potential importance of the DC as a qualifier of printed sources, already discussed in relation to the publication of the discovery of new species, as a correspondent may reveal information in the semi-private space of the letter which would for whatever reason be excluded from the public printed account. During the summarising of Collingwood and Reed's letters, their

[59]Letter from Henry Nicholas Ridley to Sir William Thiselton-Dyer, 1 November 1902, Directors' Correspondence Collection, accessed 17 January 2014, http://plants.jstor.org/visual/kdcas6832?s=t.

[60] Cuthbert Collingwood, *Rambles of a Naturalist on the Shores and Waters of the China Sea: Being Observations in Natural History During a Voyage to China, Formosa, Borneo, Singapore, Etc., Made in Her Majesty's Vessels in 1866 and 1867* (London: John Murray, 1868).

[61] Letter from Cuthbert Collingwood to Charles Darwin, 15 February 1866, Darwin Correspondence Database, accessed 22 March 2015, http://www.darwinproject.ac.uk/entry-5008.

dispute was followed with interest and discussed by the digitisation team, as the perspectives of the two men were compared.

Generating summaries takes time. In contrast to a database search, which gives immediate results (though sifting through them may take some time) the digitisation requires a close reading of *all* the letters, word by word. Hartley describes it as a "painstaking" process,[62] and the two newest members of the team describe the challenge handwriting can be, particularly when the material is unfamiliar.[63] The longer each member has worked with the collection, the better and faster they can interpret them.

The project digitisers' knowledge is also shaped by the organisation of the DC. As the letters from a correspondent tend to be bound together, chronologically, it is possible to follow the conversation as it develops. Indeed, they often contain references to previous or promised letters and shipments. In an interview with Rachel Mason Dentinger, Helen Hartley emphasises the importance of the geographic organisation:

> [The geographic organization of the collection] gives 'an idea of what is going on in a region as you're going through the letters.' As the team grows more familiar with the figures frequenting each region, they may understand allusions that might have otherwise seemed obscure. 'People will refer to other people in that region,' Helen says, so the interactions of the collectors and botanists become clearer the deeper the team gets into each body of correspondence.[64]

Thus by approaching the collection as a "body of correspondence," the knowledge gained is greater and more nuanced than would have been possible consulting the same letters individually, or even as a sequence by correspondent.

This knowledge is crucial for ensuring the quality of the summaries, particularly of longer letters, as project digitisers weigh the content of a letter against their knowledge of the collection as a whole when deciding what to include and how to phrase it. The knowledge produced through the digitisation process is generated not only through close reading, which would also be true of transcribing the letters, but through active reading. Reading each letter in order to summarise it involves constantly interpreting and evaluating the content in the context of the rest of the letter and their specialised knowledge of the collection as a whole. What are the key ideas? How can they be summed up in the clearest, most concise and most search-friendly way? Deciding what to leave out can be a difficult decision, requiring some thought. Writing the summaries also involves an element of research, as the team uses both the Global Plants and a number of other online resources when something is unclear or a new correspondent is introduced.[65] This is particularly important to ensure accuracy and translate names of plants and places which are now out of date. This eclectic research illustrates the

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[62] Helen Hartley, "History of Art in the Directors' Correspondence: The Painting of an Iconic Kew Image," accessed 14 January, 2014, http://www.kew.org/discover/blogs/history-art-directors-correspondence-painting-iconic-kew-image.

[63] Jon Nicholls and Jess Smith, "Old Letters Meet New Faces," accessed 10 January, 2014, http://www.kew.org/news/kew-blogs/library-art-archives/old-meets-new-.htm.

[64] Mason Dentinger, "Men of Letters," 59.

[65] The main resources are listed in Harrington, "The Digitisation of Kew's Directors' Correspondence Collection," 46.

fruitful approach of combining close reading of the letters with subject searches on the database, which meet through the interpretation and curiosity of an individual researcher. Engaging with the letters on this level makes them easier to remember, which increases the possibility for recognition and connection through which knowledge is generated.

This knowledge is being exchanged through other channels beyond the Global Plants database.[66] The digitisation team is active on several online forums, including the Library Art and Archive (LAA) blog and Twitter. The team members take turns writing the monthly blog contributions, which is a forum for sharing the funny, tragic, bizarre or otherwise noteworthy stories discovered through digitising. A post by Charlotte Rowley illustrates the combination of reading and searching: she recounts how reading a letter from Edward Lear describing Hooker's love for Mount Kanchenjunga made her curious about other references to the mountain, which she found through a search of the material digitised so far.[67] These social media are also enabling connections and exchanges beyond RBG, Kew. The Twitter feed led to one member, Virginia Mills, contributing a guest post for Toby Musgrave's blog "Garden History Matters,"[68] and the Trading Consequences project has written a guest post for the LAA blog.[69] The Trading Consequences project is using data mining to provide visualisation tools for "interesting views of historical collections which so far only tend to be accessible by historians through key word search." They point out that they mine the metadata, including the summaries, rather than the letters themselves.

Exhibitions are another channel, which in their material form can only be accessed by staff and visitors to the Gardens. The digitisation team put together a small exhibition on Augustine Henry which was displayed in the RBG, Kew library reading area. One particularly interesting aspect of this exhibition is that it reunites material that on receipt was separated into different collections,[70] including "the Archive, Library, Economic Botany and Illustrations collections, all relating to Henry's original letters."[71] A few letters were also displayed as part of the exhibition in "Joseph Dalton Hooker: Botanical Trailblazer" in the Shirley Sherwood Gallery. In this sense, the letters have become a catalyst for connections between different collections at RBG, Kew, both by reforging connections between items in different collections and in collaboration between the staff of different departments. The team regularly contributes to the staff magazine *Vista*. There have also been a number of popular and scholarly articles published relating to the DC project, including Dentinger's "Men of Letters" prominently placed in the *Kew Magazine*, and Katherine Harrington's overview of the digitisation project,

[66] A number of these are outlined by under "Promotion" in Harrington, "The Digitisation of Kew's Directors' Correspondence Collection," 48.

[67] Charlotte Rowley, "Masterpieces, Mishaps and Memories: Mount Kanchenjunga in the Directors' Correspondence," in *Library, Art & Archives* (9 March 2012).

[68] Mills, "Kew Directors' Correspondence." Mills has since moved to work on the Joseph Hooker Correspondence Project, recently launched via RBG, Kew's website, which contains a wealth of background material not only on Hooker, but on the institution and botany in his day.

[69] Bea Alex, Jim Clifford, and Uta Hinrichs, "Bringing Kew's Archive Alive," in *Library, Art & Archive* (2 May 2013).

[70] Harrington, "The Digitisation of Kew's Directors' Correspondence Collection," 46.

[71] *Augustine Henry: A Botanist's Letters from Asia, China and Taiwan*, RBG, Kew Library, February 2012.

which outlines suggestions for other such projects based on what they have learned working with the DC.[72]

The knowledge of the collection which the team generates is extremely valuable. This value is beyond what can be accessed via the database, both because of engaging with more material (what is left out of the summaries, and the collection as described above), and approaching it differently—close reading supported by searching. It is limited to a small team of individuals and a particular time, and is by nature complex, changing and at times contradictory. All this has implications for communication, preservation and access, which involves different criteria to the digitisation of herbaria, where the focus is on volume, speed, efficiency and limiting the spread of inaccurate information. The blog entries, exhibitions and articles neither can nor attempt to be comprehensive. They illustrate that what is gained through an intimate knowledge of the collection cannot fully be measured in quantitative terms (though it does provide privileged access to the material), providing insights into botanical knowledge as shaped by a complex web of processes, relationships and contradictions. Just as the letters reveal the importance of the process and context to knowledge formation, the blog and other channels add a certain transparency to the digitisation process behind the database. Other channels include the guide to searching for letters on the database according to different criteria, which the DC team links to from their page on the LAA blog. These examples are steps towards Michael Ullyot's call for digitisers to "lift the veil, not only to reveal what their data is … but also to describe the processes they used to gather, verify, transcribe, and regularize the information."[73]

Epistemological Consequences: Knowing from a Distance

The epistemological implications of the digitisation of the Directors' Correspondence collection requires taking into account two periods of deracination or displacement: the creation of the archive through imperial botanical networks, and the digitisation of the DC made available through the Global Plants database. The stability and combinability of collections concentrated in centres of calculation, such as the DC at RBG, Kew, enable large patterns to emerge that are not visible at close range. They enable knowing from a distance. When botanical collections are digitised, much larger datasets can be analysed more efficiently. Similarly, digitisation and the all-important metadata and digital tools—such as databases and data mining—are opening up the possibility for correspondence and other textual sources, conventionally approached through close reading, to also be analysed through "distant reading."[74] There is a risk of falling into a binary opposition between close reading or hermeneutics on the one hand, and data mining or key word searches on the other. However, digital humanities scholars such as Matthew Jockers emphasise that close and distant, or micro and macro, readings are complementary approaches:

[72] Harrington, "The Digitisation of Kew's Directors' Correspondence Collection," 48. This was linked to the Natural Science Collections Association (NatSCA) 2012 conference, and published in the *NatSCA News*.

[73] Michael Ullyot, "Review Essay: Digital Humanities Projects," *Renaissance Quarterly* 66, no. 3 (2013): 937.

[74] Moretti, *Distant Reading*.

> Human interpretation of the "data," whether it be mined at the macro or micro level, remains essential. While the methods of enquiry, of evidence gathering, are different, they are not antithetical, and they share the same ultimate goal of informing our understanding of the literary record, be it writ large or small.[75]

As we have seen, the DC project digitisers combine both approaches, so that their knowledge of the collection is different and, I argue, richer than either a close reading of letters in the pre-digitised archive, or a key word search on the Global Plants database. Using close and distant reading to discuss the digitisation project is useful in analysing how knowledge is produced, but it is important to note that the digitisers' close reading is shaped by the pragmatic concerns and constraints of the project, rather than by the theoretical frameworks adopted by an historian or literary scholar. Equally, a key word search is a very simple form of distant reading, in which the end-user (unlike the digitiser) has no part or even insight into the design of the metadata. From a botanical perspective on digitisation, something is better than nothing; however, from a historian's perspective, an incomplete record raises concerns about what is inaccessible and why. In the case of the DC, the summaries decide what is searchable—and what is not. The digitisation of the DC provides a platform for examining the role of metadata in stabilising source material, making it searchable and combinable – in short in making it possible to know from a distance. The Trading Consequences project illustrates how useful the summaries are as data mining material, but it is significant that the project specifies that it is the metadata and not the letters which have been used in the process. Even with the acknowledgement that data mining is a form of 'reading' that requires interpretation, the mediating role of gate keepers and technology becomes invisible in the extractive approach through which larger patterns become visible.

The media scholar Pelle Snickars considers data mining, described "as the process of extracting more or less hidden patterns from huge amounts of data,"[76] to be more than a useful tool, and epistemologically superior to hermeneutics:

> But since it has been more or less impossible to deduce patterns out of large sets of cultural objects prior to the usage of computers, the hermeneutical tradition of close qualitative readings have been favoured. What data mining suggests, however, is that cultural and art sciences dealing with the past are now able to shift from a hermeneutical perspective to a kind of cultural science of heritage material.[77]

While this is an extreme position, historians are increasingly recognising the importance of keeping abreast of digital tools already adopted in the sciences.[78] At the same time, botanical literature (including correspondence) continues to play a central role in, for instance,

[75] Matthew Jockers, *Macroanalysis: Digital Methods and Literary History* (Chigaco: University of Illinois Press, 2013), 26.

[76] Pelle Snickars, "Archival Transitions: Some Digital Propositions," in *Media, Popular Culture, and the American Century*, ed. Kingsley Bolton and Jan Olsson (London: John Libbey Publishing, 2010), 319.

[77] Snickars, "Archival Transitions," 321.

[78] Hitchcock, "Confronting the Digital," 20.

traditional taxonomy. The corpus of botanic literature, dating back to Linnaeus, is both highly valued by taxonomists and a burden to them.

Without looking more closely at a range of botanical practice, it is difficult to gauge the extent to which this literature is engaged, beyond its relevance to taxonomy. However, insights may be gained from the knowledge metaphors used to describe their research, specifically "nuggets of biological information."[79] Nuggets of gold are valuable, solid and stable. They occur naturally in pure or native form rather than in ore, so that they can be collected directly without going through a process of smelting. They exist independently of their context. In fact, they are rather like naturally occurring immutable mobiles. Gold nuggets are an apt knowledge-gathering metaphor for both the botanical use of collections and the keyword search considered in this paper. To begin with the DC, the letters were initially written and bound in the attitude of collecting and preserving these 'nuggets,' as the annotations on the letters suggest, reflecting Joseph Hooker's ultimate interest in the philosophical, global, study of plants, that the letters were used as material containing botanical facts that could be gleaned.

Helen Hartley also uses the nuggets metaphor when reflecting on the value of the digitisation process, in a blog entry narrating her discovery of a series of letters concerning the painting of a famous portrait of Sir William Jackson Hooker.

> However, the letters from Boott illustrate—once again—what interesting nuggets of historical information lie buried within Kew's Directors' Correspondence collection. The digitisation process, which involves the painstaking work of reading through all of the letters, has been so important in uncovering such gems and in serving to illustrate just how diverse and historically interesting the collection is![80]

Although the same metaphor occurs, here of 'historical' rather than 'botanical' information, it reflects a very different approach to how knowledge is attained. The nuggets and gems are found through the slow, laborious work of the digitisation process described above. Unlike the technologically mediated data mining, reading the letters requires direct engagement with and interpretation of the texts. As Joshua Sternfeld argues,

> Digital historiography also reminds us that in spite of the advent of advanced computational processes, digital tools, and new representational formats, we must continue to preserve the fundamental humanistic activities of close reading, interpretation, and historiographic engagement.[81]

It matters what language is used to talk about and analyse digital tools and how they shape knowledge-making. After discussing 19th century definitions of the word "professional," Jim Endersby reflects that "[t]his preoccupation with what is sometimes called 'actor's categories' is not just a matter of academic pedantry; language is not a neutral medium for conveying facts but a complex method of persuasion."[82] Perhaps a different knowledge metaphor to that of

[79] Godfray *et al.*, "The Web and the Structure of Taxonomy," 945.
[80] Hartley, "History of Art in the Directors' Correspondence."
[81] Sternfeld, "Archival Theory and Digital Historiography," 575.
[82] Endersby, *Imperial Nature*, 27.

nuggets and gems is needed to discuss and analyse the mutability of digitisation, one that reflects the losses and changes involved as well as the continuities and gains?

Conclusion

The Global Plants database provides access to a wealth of biocultural information. However, despite the easy access of the key word search, it is not a "neutral repository" offering nuggets for the gold-gatherer. By focusing on the selection processes involved in the creation and digitisation of the Directors' Correspondence collection and the herbarium, it is clear that the words which can show up in a search—and the words which cannot—depend not only on the mediation of digital technology, but on the choices of correspondents, archivists, digitisers and the end-user. In this account of the Directors' Correspondence Project, the history of botany provides an allegory for digitisation which is sensitive to the possible consequences of mutability: more than a metaphor, it intersects quite literally with collections, deracination, dismemberment and transplantation. This mutability takes different forms, from chance, pragmatic considerations, technological limitations and deliberate exclusions reinforcing hegemonic structures. This account also stresses the power of standardisation (with the necessary loss of linguistic diversity) which is essential to knowing from a distance. As in the case of Nathaniel Ridley's letter quoted at the outset of this paper, the losses involved in summarising the letter are not just quantitative: the irony is lost, as is the word "enshrinement" itself. This calls to mind Donna Haraway's scepticism about the success of collection-based conservation practices: "Expensive projects to collect 'nature's' diversity and bank it seem to produce debased coin, impoverished seed, and dusty relics."[83]

The DC project highlights the distance between the plants growing in the jungle and preserved in the herbarium, between the correspondents and the world of RBG, Kew, and between the material letters and their virtual representation as digital image and metadata. This paper has argued that digitisation involves a displacement, deracination and dismemberment of source material which is comparable to that of the plants and accompanying letters sent to RBG, Kew's growing collections, archival and otherwise. It is a process of selection. The archive is shaped by processes of selection which decide what is included and who has access. These are both reproduced and added to through digitisation. At the same time, however, the DC project is a process of reconnecting collections and ideas and opening them up in new ways to new users—a 'transplantation' as it were. Both the archive/herbarium and database involve displacements which open up distant lands of possibility, a utopian vision of universality, an enshrinement of global plants. An analysis of the digitisation of the DC brings these two displacements side by side, suggesting that attention to the epistemological implications of the digitisation process is important not only to the historian using the Global Plants database, but also to the botanist. This involves a shift of focus from the products (archive and database) to the process of selection in which digitisation is the latest instance.

The Global Plants database reflects the botanical use of digitisation to meet the urgent need of making as much material available as possible as quickly as possible, which when mediated through technology can be easily accessed globally. In contrast, producing the

[83] Donna Jeanne Haraway, "The Promises of Monsters: A Regenerative Politics for Inappropriate/D Others," in *The Haraway Reader* (New York: Routledge, 2004), 64.

metadata is necessarily a slow and laborious process in which all the material is processed and interpreted by a small team of individuals. The knowledge gained through the digitisation process is shaped by the collection as a whole, which holds more information than can be accessed through the letters, and especially through the summaries alone. Increasing access in one area increases the inaccessibility of that which is excluded. Thus the digitisation process provides a highly privileged access to the DC, combining hermeneutics with data mining to produce a knowledge of the collection which is unique and extremely valuable. The LAA blog entries, articles and exhibitions are an important step towards creating awareness of the process and communicating the knowledge it generates. Given the number of digitisation projects currently underway, it is crucial that more attention is given to this process so that the knowledge generated through this unique opportunity is not lost.

In the case of the DC, integrating this knowledge is also a question of responsibility. The letters are narratives of power and empire, describing candidly and in detail RBG, Kew's key role in the coproduction of resource exploitation and scientific knowledge in the 19th and early 20th century. As the annotations on the letters reflect, this involved extracting information of scientific or economic value from the closely linked wealth of biological and cultural diversity, to the exclusion of the "native" and the local. While this particular collection belongs to the past, many of these practices are ongoing, and responsibility for how these narratives are used belongs to the present.[84]

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[84] Bioprospecting is a case in point. See, for instance Cori Hayden, *When Nature Goes Public: The Making and Unmaking of Bioprospecting in Mexico* (Princeton & Oxford: Princeton University Press, 2003).

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