From the South Seas to Soho Square: Joseph Banks's Library, Collection and Kingdom of Natural History

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The library and herbarium of Joseph Banks was one of the most prominent natural history collections of late eighteenth-century Britain. The examination of the working practices used in Banks's library, which was based at 32 Soho Square from 1777, reveals the activities of the numerous individuals who worked for Banks and on his collections from the early 1770s until 1820. Banks's librarians and their assistants used a range of different paper technologies to classify and catalogue the vast numbers of new botanical species being discovered at this time. These practices of managing information changed as the decades progressed, reflecting the changes to systems of classification and the different research projects of Banks and his natural historical staff. Banks's great wealth and powerful position as President of the Royal Society gave him the means to build and use this rigorously organised collection and library to influence a range of other private and institutional collections for almost fifty years.

Key words: Joseph Banks, Natural history, bibliography, herbarium, imperial science, Linnaean classification.

On 12 July 1771, Joseph Banks and Daniel Solander disembarked from the ship *Endeavour* in the English port of Deal, having returned from James Cook's first voyage to the South Seas. The specimens and documents they compiled and collected, which related to hundreds of species of plants previously unknown to European natural history, formed the foundation of Banks's herbarium and library, which remained one of the largest and most prominent until Banks's death in 1820. The main aim of this article is to survey the approaches used over a forty-nine year period to manage this vast quantity of information, which continued to increase in size as Banks received specimens, descriptions and publications from correspondents around the globe. Over this time, the various subsections of the collection developed alongside changes in systems

of classification and revisions initiated by Banks and the eleven different librarians and assistants he employed.

Systems for structuring information on a global scale were of the utmost importance to Banks as an imperial agent and landowner, who recognised the importance of classificatory order to ease administration.[1] This is apparent from Banks's comments on a new system of weights and measures to the French mathematician Auguste-Savinien Leblond (1760–1811), emphasising the 'great importance' of a universal measure, which could only be accepted if 'the principles on which it is founded are simple & sufficiently correct to be reconstructed with rigorous exactitude in every part of the globe.'[2] Banks's desire for a similar kind of order is apparent throughout his botanical collection, which was kept at his London mansion at 32 Soho Square from 1777.[3] The methods of information management employed in Banks's library were made up from a complex array of paper technologies, the use of which was established by Banks's first librarian, Daniel Solander (1733–82), to record and classify species according to the system devised by Carl Linnaeus (1707–78) and held their basis in the working practices of Linnaeus himself.[4] Banks initially used these paper technologies at the British Museum from the mid-1760s and when on the *Endeavour*, proving that these Linnaean methods of managing and classifying information could be used on a global scale. These were adapted by Solander's successors, amongst whom were Jonas Dryander (1748–1810) and Robert Brown (1773–1858), and were compiled from: interleaved and annotated printed books, most notably successive editions of Linnaeus' *Species Plantarum*; a series of Manuscript Slip Catalogues designed to record and order descriptions of species in a similar manner to index cards; and the physical specimens in the collection (chart 1).[5]

The employment of different naturalists in Banks's library, 1771–1820

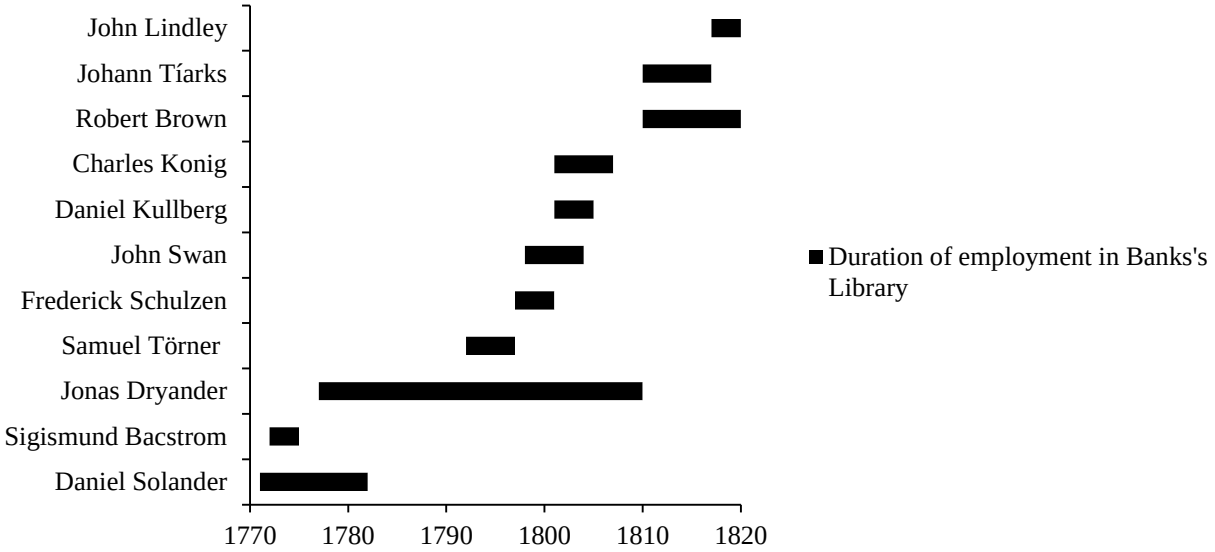

Chart 1. A chart which gives a chronological account of the individuals who worked in Banks's library from the return of the *Endeavour* in 1771 to his death in 1820.

The understanding of these approaches to managing information through different paper technologies has received a significant amount of attention from historians of science in recent decades.[6] Staffan Müller-Wille and Isabelle Charmantier have examined similar working practices in terms of the Linnaean collection, paying particular attention to the use of these paper technologies to order and retrieve information.[7] However, the period from towards the end of Linnaeus' life in the late 1770s to the mid-nineteenth century witnessed a vast acceleration in the rate of discovery and description of new species.[8] Therefore, by turning to the example of the use of these paper technologies in Banks's library, this article will analyse how Banks was able to harness his wealth and power to create one of the most comprehensive botanical collections of the age, using his resources to employ multiple staff who ensured that these methods of information retrieval were maintained and continued to cope with the continual additions to the collection. This will show how these paper technologies were adapted and repurposed over time

by a range of different individuals, following the aims and interests of Banks and his librarians, who were influenced by the growing imperial state.[9]

An examination of the changes made to Banks's collection from 1771 to 1820 reveals the activities of the numerous individuals who worked at Soho Square. These included Banks, his main librarian and one or two assistants at any one time, the majority of whom were trained under and recommended by Linnaeus or his successors. These librarians and assistants remain in the periphery, often not mentioned by name in contemporary accounts of Banks's library, such as that given by the American chemist Benjamin Silliman (1779–1864) who visited Banks in 1805: 'he has a librarian constantly attending in the library: he is a Swede and himself a man of learning. There are also, I believe, two secretaries. Sir Joseph can well afford this, for his income is seven thousand pounds sterling.'[10] This army of highly qualified Linnaean naturalists, similar to the 'invisible technicians' of seventeenth century England discussed by Steven Shapin, tended to go unnamed; the library was always referred to as belonging to Banks, who successfully presented the work undertaken within the walls of his house in Soho Square as his own.[11] This article explores the extent of these individuals' agency when devising and adapting the array of different paper technologies used to catalogue and classify botanical specimens in Banks's collection, adding an additional insight to the collaborative nature of natural history in the late eighteenth and early nineteenth centuries.[12] Throughout this period, Banks sought to integrate his collection with those of other naturalists and institutions, two examples being those of James Edward Smith (1759–1828), from 1784 the owner of the Linnaean collection, and the British Museum, that opened its doors in 1759.[13]

State institutions, such as the British Museum, remained relatively insignificant when compared to the private collections of Smith, Banks and others. These private collections

developed in a similar manner to British industry in the late eighteenth century, which thrived from an abundance of natural resources, access to the largest free trade area in the world, private wealth and a lack of state intervention or regulation.[14] Therefore, when compared to France, where natural history became ever more concentrated in state institutions, particularly following the establishment of the Muséum National d'Histoire Naturelle in 1793, the natural historical wealth of Britain remained dispersed amongst multiple private collections, such as that of Banks.[15] The British Museum's collecting was subject to severe financial constraints, meaning that the institution had to rely on donations provided by individuals such as Banks, who had a far greater income and annual expenditure on his collection than the Museum.[16] As a result, institutions remained relatively insignificant and only began to gain precedence and state backing from the mid-nineteenth century.[17] Therefore, an understanding of the methods used to structure information in Banks's collection can show how it interacted with collections of other individuals and institutions, Banks utilising his vast natural historical resources to exert his influence over these. Banks's position as President of the Royal Society combined with his great wealth, which amounted to an annual income of £16,000 by 1820,[18] ensured that he could acquire numerous botanical specimens. As a result, he shaped the activities of other collectors, agents in the field, state institutions and employed highly qualified staff to organise his own collection. Therefore, the study of the practices Banks and his staff utilised to manage the collection at Soho Square gives a new perspective of how these approaches to the practice of natural history and the collection itself interacted with the latticework of institutions and private collections that formed what David Philip Miller has termed the 'Banksian Learned Empire'.[19]

For this purpose, this article begins by examining the initial growth of Banks's collection prior to his move to 32 Soho Square and attempts to link it with that of the British Museum. I

then survey the approaches used to manage the collection in the 1780s and 1790s, paying particular attention to the growth of the collection and the activities of Banks's various amanuenses over this period. Finally, I examine the period after 1800 and the changes in how the collection was managed, especially after Dryander's death in 1810, the onset of Banks's ill health and changes in systematic classification.

Building and classifying a collection

From 1771 to 1777, Banks was looking to expand his natural history collection and library, which were kept at his London townhouse on New Burlington Street. This not only required purchasing the most recent publications from booksellers and obtaining specimens through correspondence with naturalists, but involved obtaining the collections of his recently deceased colleagues. One of these was Philip Miller (1691–1771), the former head gardener of the Chelsea Physic Garden, author of *The Gardeners Dictionary* and a correspondent of many major natural historians of the early to mid-eighteenth century, such as James Petiver (c. 1665–1718), Hans Sloane (1660–1753), Peter Collinson (1694–1768) and Linnaeus.[20] In 1774, Miller's son, Charles Miller (*fl*. 1760–89), at this time keeper of the botanical garden at the University of Cambridge, made the choice to sell much of his father's collection though the booksellers Samuel Baker and George Leigh before he took up an appointment as a botanist in Bencoolen, Sumatra, a British colony since the late seventeenth century.[21] This was one of the largest collections of natural history books to have been sold in Banks's lifetime; the title page of the sale catalogue emphasised 'a fine Collection of Books in Natural History', but the auction also contained lots comprising herbarium specimens and manuscripts.[22]

Miller's collection was of great interest to Banks and gave him the opportunity to acquire a range of scarce botanical books that had been published since the mid-seventeenth century, many of which were central to the practice of natural history.[23] In the end, Banks purchased the majority of items at this sale, as evidenced by the annotated sale catalogues which refer to many of the lots being purchased by 'Banks'.[24] Among the books he purchased from Miller's library were the first two volumes of John Ray's *Historia Plantarum* (1686–1704), a copy printed on large paper with extended margins, which cost Banks fifteen shillings and six pence.[25] The evidence for Miller's former ownership of these volumes is apparent from his autographed 'P. M.' on the verso of the title page underneath Banks's 'Jos: Banks' book stamp, signs of ownership that appear on all of the books Banks acquired from Miller's collection.[26] Banks evidently obtained the third volume of *Historia Plantarum* from another source; it was originally a smaller format copy and does not contain any of Miller's ownership marks, although significant effort has been made to ensure that it could be annotated in the same manner as the first and second volumes. The pages from this volume have been extended through the addition of paper borders so as to give the same amount of space for annotation as can be found in the first two volumes.[27]

The extended margins in Miller's copy of *Historia Plantarum* had the additional benefit of providing a platform for the addition of manuscript notes, similar to those in the copy used by Hans Sloane (1660–1753), which served as a partial index for the 265 bound volumes of his herbarium collection.[28] Very few copies of this work were printed in this format, most of which were distributed to botanists, such as Miller, Sloane and Petiver, making that possessed by Miller an appealing acquisition, especially since Banks appears to have lost the copy he took on the *Endeavour* as a result of the humidity and harsh conditions.[29] Banks's acquisition of this book

gave him the chance to create a personal copy of the catalogue for the British Museum's herbarium, as evidenced by his decision to employ his amanuenses, Sigismund Bacstrom (c. 1750–1805) to transcribe the annotations from Sloane's copy of *Historia Plantarum*, at this time held by the British Museum, into this copy.[30] Bacstrom, a German physician who entered Banks's employment in 1772 and participated in Banks's and Solander's voyage to Iceland, must have annotated the first volume of *Historia Plantarum* sometime before he left Banks's employment in 1775, when he joined a series of voyages led by William Kent.[31] The second and third volumes were annotated by Jonas Dryander, who succeeded Bacstrom in 1777, before being elevated to the role of Banks's primary librarian after Solander's death in 1782.

Bacstrom's and Dryander's annotations provide a direct transcription of those which appear in Sloane's copy of *Historia Plantarum*, the primary purpose of which was to link specific specimens to the general description of the species in *Historia Plantarum*.[32] For example, the annotated number 'H. S. 9: 13. 4' stands for *Hortus Siccus*, or volume, 9, folio 13, specimen 4 (Figure 1).[33] Above many of Bacstrom's transcribed annotations, Solander has added the Linnaean binomial, referring it to the 1762–63 edition of *Species Plantarum*, in a similar manner to that employed in Banks's copy of Sloane's *A Voyage to Jamaica* (1707–25), which Banks and Solander took on board the *Endeavour* in 1768.[34] Comparable annotations undoubtedly formed an important resource for those using Banks's materials. In a letter dated 5 January 1788, the natural history publisher Benjamin White (1725–94) commented on the annotations in Banks's copy of Partick Browne's *The Civil and Natural History of Jamaica* (1756); 'Observing that Linnaeus' specific names are written in the copy of your book, & also on the Plates, it has occurr'd to us, that it may be useful either to print a list of the Plates with their Names, or to engrave them on the Plates'.[35]

The addition of references to *Species Plantarum* in Banks's copy of *Historia Plantarum* allowed those using this book to associate Ray's description with the Linnaean binomial name and the correct systematic placement of these species in Linnaeus's work. For example, the description next to which Solander appended the name *Centaurea calcitrapa* L., the reference to *Species Plantarum* (p. 1297) allows the reader to associate this binomial with the higher ranks of the Linnaean system, including the genus *Centaurea*, and the class Syngenesia: Polygam[ia]-Frustran[ea], this class being defined primarily in having the stamens fused at the anthers.[36] This binomial, combined with Bacstrom's annotations, indicates that there are nine recorded examples of this species in the bound volumes of the British Museum's Sloane herbarium, allowing for those who had access to this copy of *Historia Plantarum* to directly associate all of these individual specimens with the Linnaean system. These Linnaean additions to a pre-Linnaean collection gave Banks unprecedented access to these early specimens, some of which had been used by naturalists to formulate published descriptions and images later cited and used by Linnaeus to construct the descriptions published in *Species Plantarum*.[37]

This approach to managing information is nearly identical to that used by Solander when he renamed and reclassified the British Museum's collection from 1763–68. This provided a resource for natural historians who continued to follow earlier systems of classification, such as that of John Ray, which dominated natural history in Britain until the third quarter of the eighteenth century, and the more recent Linnaean system. These volumes were then combined with more flexible paper technologies, such as the interleaved copy of the 1762–3 edition of *Species Plantarum*, which had been annotated with entries that describe the new species collected by Banks and Solander from the Pacific by Herman Spöring (1733–71), who perished shortly after the *Endeavour* left Batavia.[38] A typical example is *Centaurea calcitrapa* L., a

species Solander recorded in his Manuscript Slip Catalogue as being found in Madeira, originally a set of loose index cards of approximately four by six inches (10.16cm × 15.24 cm) arranged in twenty-four Solander boxes, each of which contained slips referring to genera and species in one of the twenty-four Linnaean classes.[39] This shows how this Linnaean binomial name formed an essential bridge between these earlier paper technologies, which primarily took the form of bound volumes, and the more flexible paper technologies that had emerged in the early 1760s.

The close association of Ray's and Linnaeus' systems of classification created, in the form of Banks's annotated copy of Ray's book, a tool which united these two systems, making Banks's collection the initial reference point for any Linnaean naturalists wishing to make use of the British Museum, fundamentally linking the two institutions. This presents a new insight into the initial growth of the Banksian Learned Empire, showing how Banks combined his own collection and that of the Museum through holding a detailed systematic index of the botanical collection.[40] The relationship between the British Museum's collection and Banks's own gave him the opportunity to take full advantage of these materials, a task that was also facilitated by Solander's simultaneous appointments both as Banks's librarian and Librarian for the Museum's Department of Natural and Artificial Curiosities. This relationship between Banks's private collection and that of the Museum was strengthened in 1778 when Banks was elected as President of the Royal Society, a position that gave him an automatic place on the Museum's Board of Trustees. Banks could now influence both the staff employed by the Museum and those who were permitted to use the reading room.[41] The close relationship between Banks's and the Museum's collection ensured that Linnaean naturalists who wished to use the Museum had to use Banks's resources, building Banks's network of naturalists and ensuring that they had to

remain on good terms in order to access the collections, an important strategy for ensuring his successful election as President of the Royal Society in 1778.[42]

The Establishment of Banks's Taxonomic Empire

In August 1777, Banks moved from New Burlington Street to 32 Soho Square, which became the main base for his operations until his death in 1820. This property had several advantages when compared to New Burlington Street. Not only was it closer to the British Museum and Royal Society at Somerset House, but it was far larger than Banks's previous London home, giving space for a domestic household, an extensive library and herbarium and a room used to accommodate artisans, such as the engravers working on the *Florilegium*.[43] Shortly after this, Banks was elected as President of the Royal Society and made a baronet in 1781, giving him access to a vast network and the highest ranks of British society.

Following these events, Banks's desire to apply a definitive structure to natural history, especially botany, through the Linnaean system became ever more apparent, especially after Smith's purchase of the Linnaean collections in 1784. In a letter to the Italian naturalist Giovanni Valentino Mattia Fabbroni (1752–1822) dated 4 February 1785, Banks commented that 'Masson, who is lately returned from Barbary has brought many new plants for the King's Gardens where Botany Flourishes as much as Ever. Linnæus's herbarium has been purchased by an Englishman & is safely arrivd here so that we are masters of the definitions of Species Plantarum.'[44] Banks regarded the Linnaean collection as 'the real standard to prove the meaning of old Linnaeus's works,' showing that he believed the specimens that had been used by Linnaeus served as models for their respective taxa in the form of 'classification types' and were essential for bringing structure and stability to Linnaean naming practices.[45] After this, Banks purchased the

herbarium of George Clifford III in 1792, which Linnaeus had used in writing his *Hortus Cliffortianus* (1737) and that of Paul Hermann in 1793, which Linnaeus had used to prepare *Flora Zeylanica* (1747). After observing Hermann's collection, Dryander described how 'Linné has written the numbers for flora zeylanica under every plant, and often the generic name, and some times the synonyms.'[46] These materials, when combined with Smith's, made Britain an uncontested centre for botanical knowledge – nearly every specimen Linnaeus had used to formulate a succinct description or diagnosis for his botanical publications was held either by Banks in London or Smith in Norwich. The fact that these Linnaean specimens were now held in British collections was of great importance to Banks, who could not only influence the use of the Linnaean material, but could use it to apply more definitive standards to classificatory practice and attempt to reduce the numbers of synonyms used for each species.[47]

As a result of the rapid rates of discovery and publication of descriptions of new species during the late eighteenth century, Banks's botanical collections grew so rapidly that they soon expanded beyond the capabilities of the paper technologies Solander had designed and the physical space in which they were situated. In 1792 Banks hired the architect George Dance Jr. (1741–1825) to alter the library space at Soho Square, adding a gallery and lifting the library roof so as to accommodate an additional floor for books.[48] The benefits of this new space were made clear by Dryander in a letter to Banks when the latter was away in the country: 'In room for books I shall not loose by it, rather gain more wall, but the remainder, upon three sides are occupied by bookcases, will be very small, but still sufficient for making Tea on Saturday nights'.[49] Shortly before these renovations, Banks donated much of his zoological collection to the British Museum, the Linnean Society of London and the museum of John Hunter in 1792.[50] After this point, Banks's collection was almost exclusively devoted to botany, to which it was

still possible to apply Linnaean conventions. This was very different to zoology, in which Linnaeus' classificatory system had been largely superseded. As a result, botany continued to appeal to Banks's broader imperial aims.

In addition to altering the space used to hold the library and herbarium, the methods of managing information for the collection had to be updated. Solander had originally relied on the 1762–63 edition of Linnaeus' *Species Plantarum*, a publication that was almost thirty years old by the early 1790s. Therefore, Banks and Dryander chose to replace this book with a more recent edition of Linnaeus' works entitled *Systema Plantarum* (1778–80), essentially a posthumous third edition of Linnaeus' *Species Plantarum*, published in four volumes and edited by the German physician and botanist Johann Jacob Reichard (1743–82).[51] In a similar manner to Banks's copy of *Species Plantarum*, this book was interleaved with blank pages which were then filled in with descriptions of specimens from the herbarium that had not yet received a published description. These were continuously acquired throughout the 1780s and 1790s as part of new consignments of plants sent by correspondents from across the globe. Descriptions of new genera and species were accompanied by annotations which provide references to descriptions that had been published since the publication of *Systema Plantarum*, therefore, keeping this book up to date with all new discoveries (Figure 2a). These interleaved volumes form a truly Baconian repository of knowledge which not only organised information on new species, but classified and stored information on all of the new botanical discoveries published since 1780.[52]

Dryander undoubtedly required additional assistance for the large task of updating Banks's collection to Reichard's *Systema Plantarum*, an occupation that had lost much of its former prestige by the early nineteenth century, being relegated to the position of mere secretarial work.[53] This help came in the form of another Swedish naturalist, Samuel Törner

(1762–1822), who was employed as Dryander's assistant from 1792 to 1797.[54] Törner had been recommended to the post of Banks's assistant librarian by the Stockholm-based naturalist, Olof Swartz (1760–1818), who suggested in 1792 that Törner was 'a very clever young man about 30…He has a good stock of natural knowledge (Botany etc.) and passes for well informed at the University. …He writes also in a good hand and with swiftness.'[55] In his reply to Swartz dated 17 August 1792, Banks specified that Törner's work 'will be Wholly Confind to natural history & the Good order and Arrangement of my Library.'[56] Banks was satisfied with Törner's activities, stating in a letter to Adam Afzelius (1750–1837), demonstrator of Botany at Uppsala University, that 'Botany goes on here much as it did, with me somewhat better, as I have prevailed upon a Countreyman of yours a mr Törner a master of arts & Come over for the purpose of assisting mr. Dryander in my Library & he proves very well informed & very Diligent'.[57] Törner's expertise in Linnaean working practices came from his training at Uppsala University under Linnaeus the Younger (1741–83), professor of medicine and botany, and his successor Carl Peter Thunberg (1743–1828). During his time at Uppsala, Törner annotated an interleaved copy of Anders Jahan Retzius's *Floræ Scandinaviæ Prodromus* (1779) in 1781, adding descriptions of new plant species collected during field expeditions to Lapland and information on those which had been successfully cultivated in the Uppsala Botanical Garden.[58] Therefore, Törner not only had expertise in the Linnaean system of classification, but was trained in Linnaean information management practices with specific experience in annotating interleaved volumes, making him the ideal candidate to assist Dryander at Soho Square.[59]

The work required of Törner by Banks and Dryander, however, was far more ambitious than the production of a mere national flora.[60] Rather, the annotation of Reichard's *Systema Plantarum* was designed to form an up to date flora of the entire globe, unifying information on

specimens in Banks's herbarium, those sent by correspondents and those that had been described and depicted in recent publications. On 5 December 1793 Törner wrote a long letter to his friend at Uppsala University, Samuel Liljeblad (1761–1815), in which he described his main task as transferring 'those notes which Dr. Solander did in Systema Naturae either in genericorum charactorum or specificorum or other improvements or additions' onto the blank interleaved pages 'in Reichards edition of Species Plantarum Linnai (or Richards so called Systema Plantarum Linnai) have by me been reduced'.[61] By 1793, Dryander was reordering Banks's entire botanical collection according to Reichard's *Systema Plantarum*, probably when returning the herbarium to its cabinets after the renovation work on Soho Square. This is apparent from Törner's further comments to Liljeblad; 'After above mentioned Systema, Musaeum Botanica Banksiana [has been] ranked so that every herb genera bundle has the same number on every page contain in his [Reichard's] system'.[62] The 'bundles' were groupings of mounted herbarium specimens, each bundle containing systematically arranged specimens of a particular genus.[63] The numbers Törner added to these bundles served the essential role of providing direct references in the interleaved publications to the specimens in Banks's collection. Specimens that related to the published descriptions in *Systema Plantarum* were given numbers that relate to those in the margins next to the printed descriptions.[64] Species that had not previously been described, or references that had not been published in this edition of Linnaeus's work, formed the main subject matter of the annotations that were added to the interleaved pages and were also numbered by Törner. These numbers refer to the physical specimens in Banks's herbarium and books in his library. Similar numbering systems were a classic practice utilised by late eighteenth-century natural history collectors to list and identify examples of new species alongside maintaining a working index of a collection.[65]

As a result of this reorganisation of the herbarium, Dryander could now incorporate the specimens that Banks had either purchased or those sent by Banks's global network of correspondents. Many of these individuals benefitted directly from Banks's financial support, such as George Caley (1770–1829), who Banks employed for fifteen shillings per week to send rare specimens back for his herbarium after he travelled to New South Wales in 1798.[66] Other collectors were driven by the curiosity of discovering new species that could then be incorporated into the Linnaean system.[67] Still others wished to collect commercially valuable plants and benefit from an association with Banks and his powerful position in London society.[68] An example of the latter is the German émigré naturalist, and employee of the Danish West India Company, Julius von Röhr (c. 1737–93), who, before his death from disease shortly after a voyage from New York to the West Coast of Africa in 1793, frequently sent Banks, Solander and Dryander specimens from the West Indies and South America from the early 1770s.[69] Röhr made journeys throughout the region from his main base in St. Croix, often entering the South American mainland without the permission of the Spanish or French authorities.[70] From 1784, Röhr sent Banks several consignments of specimens from the French territory of Cayenne (in modern day French Guiana), that included a specimen to which Dryander ascribed the name *Rhopala montana* (now *Roupala montana* Aubl.). In a later letter dated 1788, Röhr commented that he was 'much flatter'd by your Last Letter, that the Cayenne Plants I had the Honor to send by Baron Desrivières Gerss from Cayenne, did please you.'[71] Dryander consistently recorded the original locality and the name of the collector on the verso of the herbarium sheet, as is apparent his annotation 'Cayenne. Jul. von Rohr', on the specimen of *Rhopala montana* (Figure 2b).[72] Following the acquisition of the specimen, Törner added the name of the new genus as a subject heading, the binomial name, its original geographical locality along with the two synonyms and

references to the publications in which it had previously been described to the interleaved page in Reichard's *Systema Plantarum* (Figure 2a).[73] This shows a clear division of labour in Banks's library during the 1790s. Törner undertook the cataloguing work, whereas Dryander worked directly with the specimens. Dryander seems to have been applying himself to broader questions regarding geographical distribution and Banks used this research to support his wider imperial programme, such as his interests in the transportation of species, perhaps the most famous example being the movement of Breadfruit from Tahiti to the West Indies.[74]

The references to *Roupala montana* and Röhr's discovery of it in Cayenne that were added to *Systema Plantarum* relate to the more flexible paper technologies used to catalogue Banks's collection by the 1790s. As in Solander's cataloguing system, these took the form of a Manuscript Slip Catalogue, much of which was compiled by Robert Brown, who started working consistently at Soho Square in early 1795 when he became acquainted with Dryander and Törner.[75] In some instances, Brown seems to have copied out slips written during this period, which he then added to his own Manuscript Slip Catalogue. This is a similar practice to that used by Dryander and Linnaeus the Younger when the latter visited Banks in 1781, showing how these paper technologies were integrated with the collaborative practices of late eighteenth-century natural history.[76] It is probable that Brown then disposed of the duplicate slips after becoming Banks's librarian in 1810. Brown's Manuscript Slip Catalogue, which remained in use until his death in 1858, is contained within eighty-one Solander boxes, many of which were designed to hold slips that describe specimens from a specific Family listed on the spines of each box.[77] However, when it came to Families in which Brown had a particular interest, there were far too many slips to be held by a single box. For example, by 1858, the slips that relate to Proteaceae had filled three boxes.

The slips in Brown's Manuscript Slip Catalogue, which he began to compile from the early 1790s, contain similar information to those in Solander's. However, rather than the name and description for each species being on one side of a single slip, these are made up from folded over pieces of paper. On the front of each slip is the binomial, along with the original locality, the name of the collector and the herbarium in which the specimen was stored at the time (Figure 2c). The following sides contain the systematic description with additional notes on the particular specimen.[78] These are grouped into genera by pieces of paper that have been loosely wrapped around the left hand side of a series of slips each of which relate to a separate species, groupings of genera that have then been encased by another piece of loose paper, arranging these into different families, larger groupings which have then been encased within a Solander box. These slips have a very similar physical arrangement to the numbered portfolios of herbarium specimens and gave Brown a detailed record and systematic classification of the specimens in Banks's herbarium. In this way, the Linnaean system simultaneously interacted with the paper technologies and the physical structure of the herbarium.[79] Brown consistently inserted slips when new consignments of specimens were received, showing how this system for managing information accommodated continual growth. Additionally, these slips could be rearranged to adapt to new methods of classifying various species. For example, in the decade after 1800, Dryander started rearranging the collection to conform to the specifications outlined in the edition of *Species Plantarum* edited by Carl Ludwig Willdernow, published between 1798 and 1826. Banks's copy was interleaved with blank pages and bound into twenty volumes.[80]

In addition to adding manuscript annotations concerning new species to the interleaved pages in *Systema Plantarum*, Törner inserted references to the most recent botanical publications. This is apparent from a letter he wrote to Carl Peter Thunberg in mid-1795, in

which Törner reports the 'Expected publications which are quite elevating and interesting and contain plants from the coast of coromandel by Dr. Roxburgh. Doctor Smith published nothing by the New Holland Botany by numbers. Sowerby's English Botany monthly 1 number is also published by him [Smith] but under Sowerby's name.'[81] These were all books with which Törner was familiar, and included James Edward Smith's *A Specimen of the Botany of New Holland*, published in parts between 1793 and 1795, and William Roxburgh's *Plants of the Coast of Coromandel*, a series of coloured botanical plates, based on drawings by Indian artists that were published under Banks's direction between 1793 and 1819.[82] Törner's handwritten references to these publications can be found throughout the interleaved copies of Reichard's *Systema Plantarum*, showing how he not only updated this work with references to new species, but updated it with references to all recently published descriptions and images.

A typical example can be found in the species *Banksia spinulosa* Sm., the description and copperplate image of which were first published by Smith in *A Specimen of the Botany of New Holland* in 1793 (Figure 2d).[83] Törner has added references to both the copperplate image and description in Smith's work to the interleaved page in *Systema Plantarum* (Figure 2a), above which he added the title 'Banksia', indicating that he was inserting a new genus and species to the systematic arrangement.[84] However, these images were not intended represent a living version of a specific specimen from Smith's herbarium. Rather, as Lorraine Daston and Peter Galison have suggested, they were designed to follow the Linnaean botanical description, emphasising features common to every member of this species and those which defined it from the other species in the same genus.[85] Therefore, a composite image was produced using multiple specimens of the same species and descriptions that emphasised these features, providing a model for the identification of this species.[86] Smith received his specimen from John White

(1756–1832), surgeon in the New South Wales Colony and a botanical collector, who sent Smith 'a most copious and finely-preserved collection of dried specimens, with which the drawings have in every case been carefully compared'.[87] This shows how Banks's interleaved copy of *Systema Plantarum* not only formed a repository for recording new species that were accessioned into the collection, but also served as a platform of annotation designed to systematically record all newly discovered and published plant species, an arrangement that reflects changes in the practices of compiling information used throughout Europe from the mid-eighteenth century.[88] Törner's annotation provides a direct link with Smith's copperplate image, a high quality colour illustration designed to depict a standardised image of the living plant. This shows how a reference to an illustration in Banks's copy of *Systema Plantarum* formed an adequate substitute for a specimen in the herbarium; Banks only acquired an example of *Banksia spinulosa* after Robert Brown returned from the *Investigator* voyage in 1805.[89]

The amalgamation of information on physical objects and recent publications shows how these Linnaean volumes formed a continually expanding repository of knowledge at the centre of Banks's collection. These images and specimens had an equal status in late eighteenth century botany; both contributed to the annotations in the interleaved copy of *Systema Plantarum*, providing Banks and his scientific staff with an up to date classification of the herbarium alongside a systematic record of all new discoveries.[90] This successfully classified and recorded new botanical discoveries in a systematic fashion, allowing Banks and Dryander to keep track of precisely who was publishing and discovering new species. Dryander's role as Banks's librarian made their relationship mutually beneficial. Not only could Banks now present himself as a 'monarch' of natural history, but Dryander could utilise Banks's wealth and resources to position himself as a leading expert in the Linnaean taxonomy.[91] In addition to working at Soho Square,

Banks appointed Dryander as the Librarian of the Royal Society in 1782. Dryander's standing in Banks's circle and his reputation as a Linnaean naturalist gained him the position of 'Fixed Vice President' of the Linnean Society, a position that essentially made him the de facto president after Smith's consistent absence in Norwich following his marriage in 1796.[92] This appointment was almost certainly facilitated by Banks from his position as one of the four original honorary members of the Linnean Society. In 1805, both Dryander and Banks utilised their positions to secure the three-fold post of Clerk, Librarian and Housekeeper for Robert Brown, who succeeded Dryander as Banks's librarian in 1810.[93]

Robert Brown and the end of the Banksian collection

After leaving Banks's and Dryander's employment in 1797, Törner was swiftly followed by a succession of under-librarians, many of whom were Linnaean travellers recommended to the role by Uppsala professors. These included the Swede Frederick Schulzen (1770–1848), who worked for Banks from October 1797 until 1801, and assisted Dryander with his catalogue of Banks's library, *Catalogus Bibliothecae Historico-naturalis Josephi Banks* (1797–1800).[94] Another amanuensis employed from c. 1799–1805 was John Swan. Swan worked with Schulzen to transcribe Törner's and Dryander's annotations from their copy of Reichard's *Systema Plantarum* onto the interleaved pages in the Soho Square copy of Willdenow's edition of *Species Plantarum* (1799–1810), a similar task to that undertaken by Törner in the 1790s.[95]

The annotations Schulzen and Swan transcribed into Banks's copy of Willdenow's edition of *Species Plantarum* reduced in quantity when compared to those in the interleaved copy of Reichard's *Systema Plantarum*, a result of more species finding their way into print with every

new edition of Linnaeus' works.[96] These different editions represent a serial mode of organisation in Banks's collection, each of which embodies a specific period of acquiring and arranging specimens which changed alongside of the use of the collection by Banks and Dryander.[97] In addition to adding annotations that describe species, Schulzen transcribed Dryander's and Törner's annotations that provided supplementary information on specific species. A typical example is apparent from an annotation Dryander squeezed into the margin of the printed page next to the species *Solanum tuberosum* L. (potato) in Reichard's *Systema Plantarum*, in which he quotes the minutes of the Royal Society from 1693: 'The President (Sir Robert Southwell) relates that his grandfather brought Potatoes into Ireland who had them from Sir Walter Raleigh after his return from Virginia', after which Dryander added references to eight publications on the history and cultivation of this species in Europe that had not been included in the printed text, similar to those listed in the Manuscript Slip Catalogue.[98] Banks quoted this extract in his paper on the introduction of the potato into Britain, published in the *Transactions of the Horticultural Society of London* (1805), in which he traces the history of the cultivation of this species and its spread as a staple food source throughout the British Isles.[99] This shows the close relationship between these volumes of Linnaeus' works and Banks's research projects, an annotation that was subsequently copied by Schulzen onto the interleaved page opposite the description of the same species in Willdenow's *Species Plantarum*.[100] This publication is a typical example of the collaborative nature of the research undertaken in Banks's library. For example, at the beginning of his article, Banks stated that 'These notes on the *Potatoe*…were chiefly collected by my worthy and learned friend Mr. Dryander'.[101] However, Banks remained the sole author and Schultzen is not mentioned, showing how Banks successfully presented the research carried out in Soho Square as his own. Therefore, this sort of

research output from Soho Square solidified Banks's status as a leading natural historian by the early nineteenth century, although the processes of knowledge production that occurred inside Soho Square were far more complex than they appeared to most external observers.

In the years around 1800, Schulzen worked alongside another Swede, Daniel Kullberg (1773–1857) of Gothenburg, who had graduated from Lund University in 1796 with a dissertation on Linnaean botany.[102] Adam Afzelius recommended Kullberg to Banks as an appropriate replacement for Schulzen in 1801. Kullberg was 'very assiduous, writes in a good hand & is in every respect, as far as I Know, of an unblamable character'.[103] From 1801 the Göttingen naturalist Charles Konig (1774–1851) assisted Dryander, until his appointment as an assistant keeper at the British Museum in 1807, for which he received a recommendation from Banks.[104] Many of these individuals only worked for Banks for a short period of time and seem to have been following the Linnaean tradition of travel following their degree.[105] Their main task was to maintain the paper technologies used to catalogue and classify the collection and provide translations of foreign languages—for example, Banks did not speak Swedish. Dryander's presence in England at a main centre for botanical research provided a bridge for these naturalists to cross between Sweden and London during his time as Banks's librarian.

One of the first major changes to Banks's library came with Dryander's death in 1810. This ended a partnership that had lasted for thirty-three years. In a letter to the surgeon Everard Home, Banks commented that:

> I had always hoped Dryander would outlive me: he was younger & less afflicted with disease than myself. Probably it is better as things now are for him: he would have lost more in Surviving me that I lose in his death. I had arranged for him the use of my Library as long as he lived, in the same manner as he had been used to enjoy it; a Breakfast for him & my Friends every /means/ /morning./ &c, &c; but *that* might have failed.[106]

Dryander's death and Banks's subsequent employment of the Scotsman, Robert Brown, broke the distinctly Linnaean monopoly of employment in Banks's library; virtually all those who had worked for Banks before 1810 had been trained in Sweden and recommended by Linnaeus or his successors at Uppsala. As a result, the Linnaean practices of annotating the interleaved pages of Willdenow's edition of *Species Plantarum* seem to fade away. Brown was more concerned with managing the library as a resource for natural historians, rather than as a place for Banks and his staff to undertake research on the natural history collection. This is apparent from the appointment of the Göttingen Astronomer Johann Ludwig Tíarks (1789–1837) as Brown's assistant prior to his engagement as the British Astronomer to the American Boundary Line Commission in 1817.[107] Tíarks's expertise in astronomy shows the increased variety of natural philosophers who used Banks's library during the second decade of the nineteenth century, when Banks started to buy books that related more broadly to the sciences, rather than just those which concentrated on botany, agriculture and natural history.[108]

From 1810, Banks's staff had a different agenda when compared to their Linnaean predecessors. Unlike Solander and Dryander, who worked alongside Banks when cataloguing and classifying the herbarium collection and undertaking projects such as the production of the *Florilegium* copper plates, Brown and Tíarks provided access to the collection for the learned. This is in stark contrast to how, in previous decades, Banks and Dryander had closely guarded the collection. For instance, when Banks suspected the French naturalist Charles Louis L'Héritier (1746–1800) of publishing descriptions and images without his permission, he instructed Dryander 'to keep him at as good a distance as you can & limit his visits to the Library to the times when you are there & not fail to look out after specimens which are very scarce'.[109] Banks gave similar advice to other private collectors. For example, when it came to L'Héritier, Banks

advised James Edward Smith 'to be cautious in admitting him to visit Linnaeus's herbarium he will wish to find faults with it', going on to suggest a similar manner of viewing the specimens to that he gave Dryander:

> You may easily permit him to see whatever he particularly asks for but I would not in your case allow him to tumble over & examine what he thinks fit thus he must remain upon good terms with you without obtaining a sufficient knowledge of the herbarium to abuse or depreciate it with safety.[110]

In comparison, Banks's increasingly liberal attitude to allowing access was a consequence of his continual ill health and absence, mostly a result of gout, which caused him to take a back seat when managing his library and herbarium. This is apparent from a letter he sent to the former secretary of the Royal Society, Sir Charles Blagden (1748–1820) in 1816; 'Confined as I am to my bed & absent from London it is wholly out of my power to make myself usefull to Strangers…I am not Even allowd to be Carried down Stairs & on a Coach'.[111] Banks frequently missed important visitors to London, such as Georges Cuvier (1773–1838), who attempted to visit shortly after the end of the Napoleonic Wars in 1816.[112] Therefore, Brown and Tíarks had the responsibility of giving these individuals access to the Soho Square collection.

Along with ill health, the changes to natural historical research left Banks behind current scientific practice. This was a result of the decline in the dominance of Linnaean systematics, which brought with it an increased concentration on plant physiology and natural systems of classification.[113] In a letter sent to Smith in 1817, Banks commented that Antoine Laurent de Jussieu:

> has taken all Linnæus had done as his own; and having thus possessed himself of an elegant and substantial fabric, has done much towards increasing its beauty, but far less towards any improvement in its stability.[114]

From this time, natural systems such as that devised by Jussieu destabilised the Linnaean system of classification, devaluing the activities of the Linnaean naturalists at 32 Soho Square. As a result, Banks continued to serve as an active patron of the sciences, although his pre-eminence in the fields of natural history underwent a decline from around 1810. This shows how Banks was starting to lose his grip on natural historical knowledge, although he continued to maintain the Banksian Learned Empire thorough his management of integrated institutions and organisations.[115]

As a result of the decline in Banks's authority as a natural historian, an increased emphasis began to be placed on the management of the books in his library, which remained one of the most comprehensive collections of rare natural history books in Britain. A main tool used by Brown and his assistants to provide access the Soho Square library was a specially adapted copy of Dryander's *Catalogus Bibliothecae Historico-naturalis Josephi Banks* that provided a rigorous cataloguing structure.[116] The letterpress pages are mounted in paper borders, extending the margins by two inches (in a similar manner to the third volume of Banks's copy of Ray's *Historia Plantarum*) and interleaved with folio sheets.[117] As the main catalogue was printed between 1798 and 1800, these sheets were designed to be annotated with the titles of new publications added to Banks's collection, reflecting its growth and the increasingly diverse research interests of Banks, his librarians and those who used the library from 1800 to 1820. Aside from the two index volumes, which have been arranged alphabetically, the three main volumes of the catalogue have been arranged taxonomically. In a similar manner to Banks's interleaved copies of *Species Plantarum*, the notes that relate to new publications, which included both books and articles, have been inserted next to the relevant printed entries; the botanical sections have been arranged by subject and then by species, allowing for the swift

location of specific publications. As a result, the annotations are distributed somewhat unevenly throughout, reflecting the publications obtained to assist with the different research projects of Banks, his later librarians and those who visited the Soho Square library. The annotations are in five different hands; the most prominent are those of Dryander and Charles Konig, followed by Schulzen, Tíarks, Brown and Banks's final assistant librarian, John Lindley (1799–1865), who worked at Soho Square from 1818 to 1820.

The handwriting of most of these individuals is apparent in the section of Dryander's *Catalogus* entitled 'Cultura variorum Plantarum', on 'The Cultivation of various plants', a subject area Banks and his librarians became ever more interested in from the early nineteenth century (Figure 3). Many of these entries are by Dryander, who added references to André Thouin's paper on the cultivation of potatoes, published in 1804, and Thomas Andrew Knight's articles on the training of fruit trees.[118] Interspersed among Dryander's notes are those of Konig, who tended to write in pencil. Schulzen's hand, which does not appear on the pages in figure 3, is often apparent in the margins of the earlier sections of the catalogue, editing the shelf marks used to locate various publications. The next annotator is Robert Brown, who added a reference to Robert-Xavier Mallet's *Dissertation sur la manière de cultivar les Plantes De Cultiver Des Plantes Choises* (1778), which Banks purchased during the second decade of the nineteenth century, possibly a result of the relative scarcity of this publication. However, Brown's hand only appears occasionally in this catalogue – he delegated much of this work to Tíarks and Lindley. Examples of Tíarks's writing can be found on the top right of the pages in Figure 3, and include references to Thouin's paper on grafting published in 1815.[119]

The final hand is that of John Lindley, who took great interest in plant cultivation, as represented by his later career as a major patron and administrator of the Royal Horticultural

Society.[120] This is reflected by the publications he added to Banks's library catalogue, such as Baron Hepworth's 'On Pruning of Fruit-trees', a paper published in the *Memoirs of the Caledonian Horticultural Society* (1819), alongside listing articles published in the *Transactions of the Horticultural Society of London* in 1818.[121] As a result of this rigorous updating, the annotated copy of Dryander's *Catalogus* formed a unified repository of all published materials on natural history available across the globe, successfully tracing and recording all new botanical research, placing Banks's collection at the forefront of all research libraries in Britain when it came to natural history. The papers noted by Lindley related to his various research projects, such as *Observations on the Structure of Fruits and Seeds* published in 1819, and *Rosarum Monographia* (1820).[122] Unlimited access to Banks's library and herbarium collection was a huge asset to young botanists such as Lindley, who commented in a letter to Brown in 1819 that 'access to Sir Joseph's botanical stores and the society of yourself are inestimable advantages'.[123] Brown and Lindley used Banks's resources to launch their careers as some of the most prominent botanists of the nineteenth century. Brown remained at the British Museum until 1858, and Lindley was the first Professor of Botany at University College London until his retirement in 1860.

Conclusion

The Banksian library left a lasting legacy, shaping the development of botanical knowledge for nearly half a century following Banks's death. In 1827, Brown, acting in accordance with Banks's will, donated the library and herbarium to the British Museum and was responsible for curating the 'Banksian Department' until his death in 1858.[124] The amalgamation of this large private collection into that of the British Museum, alongside the advanced methods of managing

information used for its cataloguing and classification, was an essential step in the development of natural history in Britain, facilitating the movement of the main concentration of botanical research from the collections of private individuals to public institutions.[125] The various paper technologies used to manage information in Banks's library, which included annotated printed books, Manuscript Slip Catalogues and the specimens themselves, were an essential means for Banks to give a rigorous structure to botanical knowledge between 1771 and 1820. In order to undertake this ambitious task, Banks successfully mobilised his own financial resources and his powers as President of the Royal Society to employ the most highly qualified Linnaean naturalists of the age. These individuals worked in Banks's shadow, and were essential for maintaining the paper technologies used to manage information. However, these librarians and amanuenses were able to make independent decisions when it came to the management of Banks's library. For figures such as Dryander, this relationship was mutually beneficial, facilitating the means for him to establish himself as a leading expert on the Linnaean system and an appointment as Fixed Vice-President of the Linnean Society. Dryander's use of the collection advanced his career and reputation as a Linnaean botanist and one of the greatest natural history bibliographers of the age, in turn presenting Banks as a pre-eminent natural historian, allowing him to mobilise these resources for his own broader imperial aims.

The systems developed for managing information in Banks's library provided the essential means for inserting huge numbers of new species into a pre-existing system of classification, coping with the vast increase in discoveries in the late eighteenth and early nineteenth centuries. This allowed Banks's library staff to undertake the vital task of recording important information on various specimens, which included their binomial names, references to published descriptions, their taxonomic placement and geographical locality.[126] This activity

successfully incorporated information from a variety of different sources, which included that on specimens sent by correspondents from across the globe, references to newly published descriptions of specific species and references to new publications. These methods for acquiring and managing information were interwoven with the collections of institutions, such as the British Museum, along with the more important private collections such as that of James Edward Smith, which becomes increasingly apparent following Banks's purchase of the Clifford and Hermann herbaria in the early 1790s. However, Banks sought to influence the activities of collectors throughout Britain in a similar manner. Other collections with which Banks integrated his own included those owned by John Hope in Edinburgh, Thomas Martyn in Cambridge, Alymer Bourke Lambert in Wiltshire and Richard Pulteney in Dorset, who described how Banks's patronage 'to botanical science in particular' had 'justly secured to you, the grateful acknowledgements of all lovers of that science'.[127] The integration of Banks's collection with those of other institutions and naturalists shows the internal workings of the Banksian Learned Empire and how these connections were integral to natural history. Through the construction and maintenance of structures of information management used for his own collection, Banks was able to influence a wide array of other collections, the owners of which modelled their own collecting practices on those they observed at 32 Soho Square. This eased the exchange of information between these repositories of knowledge, and gave Banks sufficient authority to advise these collectors on whom they should permit to examine their collections.

The changes to the structures used to manage information in the library and herbarium at 32 Soho Square present a new impression of how Banks's interests and priorities changed throughout his life. The initial building of the collection during the 1770s, through the 1780s to the early 1800s, shows how Banks successfully used these materials to position himself in a pre-

eminent position in natural historical circles, a reputation built by utilising the skills of numerous staff, showing the natural historical applications of the Banksian Learned Empire.[128] In 1785, when criticising Banks's presidency of the Royal Society, a group of mathematicians referred to Banks as 'the Monarch of the Society'.[129] This view was also taken up by those who commended Banks, particularly when describing his library and expertise in natural history. For instance, Benjamin Silliman, who regarded Banks as a 'celebrated man', described how 'in the various departments of natural history, he [Banks] has become, by common consent, a kind of monarch over these intellectual dominions'.[130] Therefore, Banks successfully utilised his staff and the materials in the collection to earn himself the widely recognised title of 'monarch', augmenting his own reputation as a competent naturalist and using the collection to become a dominant force in natural historical research. These approaches become ever more apparent from the mid nineteenth century, when well positioned institutional naturalists emulated Banks's means for influencing natural history through sophisticated and efficient cataloguing and classificatory systems. Institutions Banks had helped to shape, such as Kew Gardens and the British Museum, took a leading role. Examples include John Edward Gray's rigorous cataloguing of the British Museum's zoological collection and projects such as the *Index Kewensis*, which was initially funded by a legacy left to Kew by Charles Darwin in 1882.[131]

This changed in the 1810s, when Banks took a back seat in managing the collection, giving this responsibility to independent botanists such as Robert Brown and John Lindley. The gradual reduction of Banks's involvement and of his pre-eminence in natural history by the second decade of the nineteenth century shows that the Banksian Learned Empire was beginning to decline before Banks's death—in contrast to his grip on institutions and societies. A prime reason for this was Dryander's unexpected death in 1810. Not only did Banks lose one of his

most valued natural historical staff, but he lost his main means for communicating with Linnaean naturalists in Sweden and his authority in the Linnean Society. Therefore, Banks's decision to employ Brown and Tíarks was a definitive turning point, opening the library to a far wider array of naturalists than previous decades. The connections forged between Banks's library and herbarium at 32 Soho Square and the specimens used by Linnaeus himself combined with the consistent use of these materials by visitors to the collections resulted in the slow response to the development of new systems of classification in Britain during the early nineteenth century, altering the development of British natural history for the significant future.

Acknowledgements

My initial thanks go to the editor of this special issue, Simon Werrett, for inviting me to present an early version of this article at University College London in 2016. I thank Jim Secord, Janet Browne, Charlie Jarvis, Alex Csiszar and the two anonymous reviewers for reading various drafts of this paper and offering invaluable comments. Additionally, I thank the Modern Sciences Working Group in the History of Science Department at Harvard University for their useful and supportive comments on this material during my brief tenure as a Visiting Fellow in late 2018. For assistance with the Swedish translations, I thank Hanna Hodacs. For access to the various collections I thank Mark Carine, Paul Cooper, Andrea Hart, Helen Pethers and the rest of the collections and library staff at the Natural History Museum, London, and the staff of Uppsala University Library. For funding this research, I thank the AHRC and Churchill College, Cambridge.

Captions:

Please use this title for the chart: **The employment of different naturalists in Banks's library, 1771–1820**

Chart 1. A chart which gives a chronological account of the individuals who worked in Banks's library from the return of the *Endeavour* in 1771 to his death in 1820.

Figure 1a. Banks's copy of Ray's *Historia Plantarum*, volume 1 (1686), page 317, which he originally purchased from the sale of Philip Miller's library in 1774. The black ink annotations are by Sigismund Bacstrom. The pencil binomial names and references to *Species Plantarum* (1762–63) are by Daniel Solander. © Trustees of the Natural History Museum, London.

Figure 1b. An enlarged section showing Solander's pencil annotation which gives the name *Centaurea calcitrapa* and Bacstrom's annotations which give the localities of examples of this species in the Sloane herbarium. © Trustees of the Natural History Museum, London.

Figure 2a. Samuel Törner's annotations on the interleaved pages in Banks's copy of Reichard's edition of *Systema Plantarum* (1779–80), on which Törner has added the reference to *Rhopala montana* and the specimen Julius von Röhr sent from Cayenne in 1784. © Trustees of the Natural History Museum, London.

Figure 2b. The specimen of *Rhopala montana* (now *Roupala montana* Aubl.) sent to Banks from Cayenne by Julius von Röhr in 1784 which Törner referred to in the annotated copy of *Systema Plantarum* (Figure 2a). The annotation (top right) appears on the verso of the original specimen. This is in the hand of Jonas Dryander and cites the collector and original locality. © Trustees of the Natural History Museum, London.

Figure 2c. Robert Brown's Manuscript Slip on its original Solander box which describes Banks's specimen of *Roupala Montana* sent by Julius von Röhr. On the front of the slip, Brown has added the binomial, and at the foot has added the original locality and collector. © Trustees of the Natural History Museum, London.

Figure 2d. The copper plate image that depicts *Banksia spinulosa* Sm., from James Edward Smith's *A Specimen of the Botany of New Holland* (1793), which Törner cited in his annotation in Reichard's *Systema Plantarum* (Figure 2a). © Trustees of the Natural History Museum, London.

Figure 3. Folio 622 from volume the annotated copy of Jonas Dryander's *Catalogus Bibliothecae Historico-Naturalis Josephi Banks* (1797–1800). These pages show additions by Dryander, Charles Konig, Robert Brown, Johann Tíarks and John Lindley. © Trustees of the Natural History Museum, London.

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[17] Gordon McOuat, 'Cataloguing power: delineating 'competent naturalists' and the meaning of Species at the British Museum', *BJHS*, **34** (2001), pp. 1–28.

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[20] Frans A. Stafleu, *Linnaeus and the Linnaeans: The Spreading of Their Ideas in Systematic Botany, 1735–1789* (A Oosthoek's Uitgeversmaatschappi N. V., Utrecht, 1971), at pp. 205–206.

[21] See, J. Kathirithamby-Wells, *Nature and Nation: Forests and Development in Peninsular Malaya* (University of Hawaii Press, 2005), at p. 28.

[22] S. Baker and G. Leigh, *A Catalogue of the Valuable Library of Philip Miller, F. R. S. and Gardener to the Botanic Garden at Chelsea Lately Deceased; Containing a good Collection of Miscellaneous Books, and a fine collection of Books in Natural History* (Baker and Leigh, London, 1774). An annotated copy can be found in Cambridge University Library, 7880 d 55.

[23] Rose, *op. cit.* (note 13).

[24] Baker and Leigh, *op. cit.* (note 22); Guy Meynell, 'Books from Philip Miller's library later owned by Sir Joseph Banks', *Archives of Natural History*. **18** (1991), pp. 379–380.

[25] Baker and Leigh, *op. cit.* (note 22), at p. 11.

[26] Meynell, *op. cit.* (note 24), at p. 379.

[27] Banks's copy of *Historia Plantarum* can be found in the Natural History Museum (hereafter NHM), London: John Ray, *Historia plantarum species hactenus editas aliasque insuper multas noviter inventas & descriptas complectens* (Samuel Smith and Benjamin Walford, London, 1686–1704), Botany Special Collections, 582 RAY F, NHM, London.

[28] There has been an extensive commentary on Hans Sloane's use of his copy of Ray's *Historia Plantarum*. See: Edwin D. Rose, 'Natural History Collections and the Book: Hans Sloane's *A Voyage to Jamaica* (1707–25) and his Jamaican Plants', *Journal of the History of Collections*, **30** (2018), pp. 15–33, at pp. 24-25; Delbourgo and Müller-Wille, *op. cit.* (note 6), at pp. 712-713; John Cannon, 'Botanical Collections' in *Sir Hans Sloane: Collector, Scientist, Antiquary, Founding Father of the British Museum* (ed. Arthur MacGregor) 136–149, esp. p. 138 (British Museum Press, London, 1994). It must be noted that in Sloane's time, the herbarium totalled at 336 volumes, although, die to re-binding, it is now held in 226 volumes.

[29] This became apparent on 25 October 1768, when Banks described in his Journal how mould was destroying the books he and Solander had taken with them on the voyage.

[30] Ray, *op. cit.* (note 27).

[31] Nicholas Thomas, ''Specimens of Bark Cloth, 1789': The Travels of textiles collected on Cook's first voyage', *Journal of the History of Collections*. (Published online 2018), at p. 8; Marshall, *op. cit.* (note 5) at p. 14.

[32] Rose, *op. cit.* (note 28).

[33] Ray, vol. 1. *op. cit.* (note 20), at p. 317.

[34] Rose, *op. cit.* (note 28), at pp. 221–225.

[35] Benjamin White to Joseph Banks, 5 January 1788, in *The Scientific Correspondence of Sir Joseph Banks 1765–1820* (ed. Neil Chambers), 6 vols., (Pickering and Chatto, London, 2007), vol. 3, at p. 367.

[36] Caroli Linnaeus, *Species Plantarum Exhibentes Plantas Rite Cognitas* (Laurentii Salvii, Stockholm, 1762–63), Botany Special Collections, 582 LINN 110, interleaved and bound into six volumes with extensive annotations, NHM, London, vol. 2, p. 1297. The class to which this specific genus and species belongs is indicated by the bold title in the header of every page that relates to species in this class of this edition of *Species Plantarum*.

[37] Charlie Jarvis, Mark Spencer and Robert Huxley, 'Sloane's Plant Specimens at the Natural History Museum', in *From Books to Bezoars: Sir Hans Sloane and his Collections* (ed. Alison Walker, Arthur MacGregor and Michael Hunter), pp. 137–157, at pp. 139 (The British Library, London, 2012).

[38] Rose, *op. cit.* (note 13), at p. 231.

[39] Daniel Solander, Manuscript Slip Catalogue, Botany Library, NHM, London, vol. xvii, f. 775. Solander's MS slip catalogue had been discussed extensively in the following papers: see Rose, *op.cit.* (note 13); Isabelle Charmantier, 'Notebooks, files and slips: Carl Linnaeus and his disciples at work' in *Linnaeus, Natural History and the Circulation of Knowledge* (ed. Hanna Hodacs, Kenneth Nyberg and Stéphane Van Damme), pp. 25–56, at pp. 35-40 (Voltaire Foundation, Oxford, 2018).

[40] For more on learned Banksian Empire, see Miller, *op. cit.* (note 19) pp. 4-5.

[41] Chambers, *op. cit.* (note 16), p. 23.

[42] John Gascoigne, *Joseph Banks and the English Enlightenment: Useful Knowledge and Polite Culture* (Cambridge University Press, Cambridge, 1994), at p. 10.

[43] Harold B. Carter, *Sir Joseph Banks, 1743–1820* (British Museum (Natural History), London, 1988), pp. 153-154.

[44] Joseph Banks to Valentino Mattia Fabbroni 4 February 1785, *The Scientific Correspondence of Joseph Banks* (ed. Neil Chambers), 6 vols., (Pickering & Chatto, London, 2006), vol. 2, at p. 20. The 'King's Garden' refers to the Royal Botanic Gardens at Kew, See Miller, *op. cit*. (note 19), at pp. 31–32.

[45] Joseph Banks to James Edward Smith, 15 August 1787, GB-119/JES/COR/1/51, Linnean Society of London, London; Joeri Witteveen, 'Supressing Synonymy with a Homonym: The Emergence of the Nomenclateral Type Concept in Nineteenth Century Natural History', *Journal of the History of Biology*, **49** (2016), pp. 135–189, at p.

139, pp. 144–147; See Lorraine Daston, 'Type Specimens and Scientific Memory', *Critical Inquiry*. **31** (2004), pp. 153–182; Lorraine Daston and Peter Galison, *Objectivity* (Zone Books, New York, 2010), pp. 59–60.

[46] Jonas Dryander to Joseph Banks, 28 October 1793, *The Scientific Correspondence of Joseph Banks* (ed. Neil Chambers), 6 vols., (Pickering & Chatto, London, 2006), vol. 4, at p. 249.

[47] Witteveen, *op. cit.* (note 45), at p. 138.

[48] Carter, op. cit. (note 43), at p. 333.

[49] Jonas Dryander to Joseph Banks, 5 September 1791, *The Scientific Correspondence of Joseph Banks* (ed. Neil Chambers), 6 vols., (Pickering & Chatto, London, 2006), vol. 4, at p. 64.

[50] On Banks's donations to the British Museum, see Chambers, *op. cit.* (note 16), at p. 21.

[51] Caroli Linnaeus, *Systema Plantarum: secundum classes, ordines, gebera, species cum characteribus, differentiis, nominibus, synonymis selectis et locis natalibus* (ed. Johann Jacob Reichard) (Varrentrapp, Frankfort, 1779–1780), Botany Special Collections, interleaved and bound in ten volumes with extensive annotations, SPECIAL BOOKS 582 LIN 74, NHM, London.

[52] See Müller-Wille and Charmantier, *op. cit.* (note 4), at pp. 4-5; Elizabeth Yale, 'With Slips and Scraps: How Early Modern Naturalists Invented the Archive', *Book History.* **12** (2009), pp. 1-36.

[53] Müller-Wille, *op. cit.* (note 8), at pp. 118-120, Bettina Dietz, 'Linnaeus' restless system: translation as textual engineering in eighteenth-century botany', *Annals of Science*, **73** (2016), pp. 143–156.

[54] See Bengt Jonsell, 'The Swedish Connection', *Sir Joseph Banks: a Global Perspective* (ed. R.E.R. Banks, B. Elliott, J. G. Hawkes, D. King-Hele and G. L. Lucas) pp.23-29, at p. 27 (Royal Botanic Gardens Kew, London, 1994). Törner is sometimes referred to as Tœrner, Turner or Torner.

[55] Olaf Swartz to Joseph Banks 9 July 1792, *The Scientific Correspondence of Joseph Banks* (ed. Neil Chambers), 6 vols., (Pickering & Chatto, London, 2006), vol. 4, pp. 135-136

[56] Joseph Banks to Olaf Swartz, 17 August 1792, *The Scientific Correspondence of Joseph Banks* (ed. Neil Chambers), 6 vols., (Pickering & Chatto, London, 2006), vol. 4, pp. 144-145.

[57] Joseph Banks to Adam Afzallius, 18 January 1793, Uppsala University Library, MS G. 2, c, letter 1.

[58] Andrea Jahanne Retzio, *Floræ Scandinaviæ Produmus; Enumerans Plantas* (Petri Hesselberg, Stockholm, 1779), Archives, D78, Carolina Rediviva, Uppsala University Library, Uppsala. Törner notes on the title page that he acquired this interleaved volume in December 178l.

[59] See Hanna Hodacs, 'Circulating Knowledge on Nature: Travelers and Informants, and the Changing Geography of Linnaean Natural History', in *Travel, Agency and the Circulation of Knowledge* (ed. Gesa Mackenthun, Andrea Nicolas and Stephanie Wodianka), pp. 74-97, at p. 82 (Waxmann Verlag, Münster, 2017).

[60] For national floras, which began to gain prominence from the 1760s, see Janet Browne, *The Secular Ark: Studies in the History of Biogeography* (Yale University Press, New Haven and London, 1983), at pp. 29-30.

[61] Samuel Törner to Samuel Liljeblad, 11 February 1794, Archives, G.320.g., Carolina Rediviva, Uppsala University Library, Uppsala, f. 1. For assistance with this Swedish to English translation, I thank Hanna Hodacs.

[62] Törner, *op. cit.* (note 61), at fols. 1-2.

[63] Müller-Wille, *op. cit.* (note 8), at p. 116.

[64] See Müller-Wille, *op. cit.* (note 8), at p. 120.

[65] Müller-Wille, *op. cit.* (note 8), at p. 123.

[66] Warren R. Dawson (ed.), *The Banks Letters: A Calendar of the manuscript correspondence of Sir Joseph Banks preserved in the British Museum (Natural History) and other collections in Great Britain* (British Museum, London, 1958), p. 193.

[67] Lisbet Koerner, 'Purposes of Linnaean travel: a preliminary research report', in *Visions of Empire: Voyages, botany and representations of nature* (ed. David Philip Miller and Peter Hans Reill), pp. 117–152 (Cambridge University Press, Cambridge, 1996).

[68] See David Mackay, 'Agents of empire: the Banksian collectors and evaluation of new lands', in *Visions of Empire: Voyages, botany and representations of nature* (ed. David Philip Miller and Peter Hans Reill), at pp. 38–57 (Cambridge University Press, Cambridge, 1996).

[69] For a short obituary of Van Röhr, see: Benjamin Smith Barton, *Collections for An Essay Towards a Materia Medica of the United-States* (Edward Earle & Co., Philadelphia, 1810), p. 21. For more information on the earlier material Van Rohr sent back, see: Dan H. Nicholson and C. E. Jarvis, 'Solander's Manuscript "Florula Indiae Occidentalis" and Swartz's "Prodromus"', *Taxon*, **39**, 4 (1990), 615–623.

[70] See, Mackay, *op. cit.* (note 68), pp. 38–57.

[71] Julius Von Röhr to Joseph Banks, 25 April 1788, *The Scientific Correspondence of Joseph Banks* (ed. Neil Chambers), 6 vols., (Pickering & Chatto, London, 2006), vol. 3., at p. 389.

[72] Specimen: *Roupala montana* Aubl., Botany, General Herbarium, BM000839776, NHM, London.

[73] Linnaeus (ed. Richard), op. cit. (note 51), vol. 1, at p. 271.

[74] See, for example, Gascoigne *op. cit.* (note 42), p. 207; Sujit Sivasundaram, 'Natural History Spiritualised: Civilizing Islanders, Cultivating Breadfruit, and Collecting Souls', *Hist. Sci.* **39** (2001), at pp. 417–443.

[75] David J. Mabberley, *Jupiter Botanicus: Robert Brown of the British Museum* (British Museum (Natural History), London, 1985), at pp. 38-39.

[76] See Charmantier, *op. cit.* (note 39), at pp. 42-43; Dietz, *op. cit.* (note 12).

[77] Robert Brown, Manuscript Slip Catalogue, Botany Library, Solander Box number 54, NHM, London, slip 54/45.

[78] Robert Brown, Manuscript Slip Catalogue, *op. cit.* (note 77), box 54, slip 54/45.

[79] Müller-Wille, *op. cit.* (note 8), at p. 116.

[80] Caroli Linnaeus, *Species plantarum exhibentes plantas rite cognitas ad genera relates cum differentiis specificis, nominibus triviaalibus, synonymis selectis, locus natalibus: secundum systema sexuale digestas* (ed. Karl Ludwig Willdenow) (G. C. Nauk, Berlin, 1797-1826), interleaved and bound in twenty volumes with extensive annotations by Jonas Dryander and others, BOTANY, 582 LIN 117-134A, NHM, London.

[81] Samuel Törner to Carl Peter Thunberg, 1795, G300 ad, Carolina Rediviva, Uppsala University Library, Uppsala.

[82] James Edward Smith, *A Specimen of the Botany of New Holland* (J. Sowerby, London, 1793–1795); William Roxburgh, *Plants of the Coast of Coromandel; Selected from Drawings and Descriptions, Presented to the Hon. Court of Directors of the East India Company* (G. Nichol and William Bulmer, London, 1793–1819) .

[83] Smith, *op. cit.* (note 82), 1793, at p. 13, table 4.

[84] Linnaeus, (ed. Reichard), *op. cit.* (note 42) Samuel Törner's annotation, vol. 1, page opposite p. 271.

[85] Daston and Galison, *op. cit.* (note 45), at p. 60.

[86] Daston and Galison, *op. cit.* (note 45), at p. 60.

[87] Smith, *op. cit.* (note 82), at p. viii.

[88] Müller-Wille and Charmantier, *op. cit.* (note 4), at pp. 11-12; Müller-Wille, *op. cit.* (note 8), at pp. 118–119.

[89] Smith, *op. cit.* (note 82) 1793, at p. 13, table 4; See Martin J. S. Rudwick, 'Picturing nature in the age of enlightenment', *Proceedings of the American Philosophical Society*, 149 (2005), at pp. 124–130.

[90] Müller-Wille, *op. cit.* (note 8), at pp. 121–123.

[91] Marie-Christine Skunke, *Carl Peter Thunberg: Botanist and Physician. Career-Building across the Oceans in the Eighteenth-Century* (Swedish Collegium for Advanced Study, Uppsala, 2014), p. 246.

[92] Andrew Thomas Gage and William Thomas Stearn, *A Bicentenary History of the Linnean Society of London* (Academic Press, London, 1988), at p. 18.

[93] Gage and Stearn, *op. cit.* (note 92), at p. 25.

[94] Marshall, *op. cit.* (note 5), at p. 6.; Carter, *op. cit.* (note 43), at p. 380.

[95] Linnaeus, (ed. Willdenow), *op. cit.* (note 80).

[96] This is in stark contrast to the interleaved volumes from the Linnaean collection, in which the annotations increase in quantity with every new edition. See Müller-Wille and Charmantier , *op. cit.* (note 4), at p. 11.

[97] See, Nick Hopwood, Simon Schaffer and James Secord, 'Seriality and Scientific objects in the Nineteenth Century', *History of Science*, **48** (2010).

[98] Linnaeus (ed. Reichard), *op. cit.* (note 51), annotation on p. 513.

[99] Joseph Banks, 'An Attempt to ascertain the time when the potato (*Solanum tuberosum*) was first introduced into the United Kingdom: with some account of the hill wheat of India' read May 7 1805', *Transactions of the Horticultural Society of London*. **1** (1805), pp. 8–12.

[100] Linnaeus, (ed. Willdenow), *op. cit.* (note 60), volume 2, at p. 1033.

[101] Banks, *op. cit.* (note 99), at p. 8.

[102] Daniel Kullberg, *Dissertation Botanica de Affinitate generum Plantarum in classibus System Sex. Linn. Obvia* (Typis Berlingianis, Lund, 1796).

[103] Adam Afzelius to Joseph Banks, 27 February, 1801, *The Scientific Correspondence of Joseph Banks* (ed. Neil Chambers), 6 vols., (Pickering & Chatto, London, 2006), vol. 5, p. 78. 'I also take this opportunity of begging you will give me leave to recommend another countryman of mine, in his [Schulzen's] place, if you should not already have fixed upon any more worthy. It is a Mr. Kullberg, M. A. now living in Gothenberg, who is a young man between twenty & thirty years of age'.

[104] Carter, *op. cit.* (note 43), at p. 380.

[105] Hodacs, *op. cit.* (note 59), at p. 78-81.

[106] Joseph Banks to Everhard Home, Revesby Abbey, 22 October 1810. *The Scientific Correspondence of Joseph Banks* (ed. Neil Chambers), 6 vols., (Pickering & Chatto, London, 2006), vol. 6, at p. 48.

[107] Carter, *op. cit.* (note 43), at p. 380. Tíarks anglicised his name to John Lewis Tíarks in the 1820s.

[108] Harold B. Carter, *Sir Joseph Banks (1743-1820): A Guide to Biographical and Bibliographical Sources* (British Museum (Natural History) and St Paul's Bibliographies, London and Winchester, 1987), at pp. 225-226.

[109] Joseph Banks to Jonas Dryander, 30 September 1786, *The Scientific Correspondence of Joseph Banks* (ed. Neil Chambers), 6 vols., (Pickering & Chatto, London, 2006), vol. 4, at p, 207.

[110] Joseph Banks to James Edward Smith, 15 August 1787, GB-110/JES/COR/1/51, Linnean Society of London, London.

[111] Joseph Banks to Charles Blagden, 19 August 1816, *The Scientific Correspondence of Joseph Banks* (ed. Neil Chambers), 6 vols., (Pickering & Chatto, London, 2006), vol. 6. at p. 209.

[112] Joseph Banks to Charles Blagden, 19 August 1816, *The Scientific Correspondence of Joseph Banks* (ed. Neil Chambers), 6 vols., (Pickering & Chatto, London, 2006), vol. 6, at p. 209.

[113] See Ann B. Shteir, 'Gender and "Modern" Botany in Victorian England', *Osiris.* **12** (1997), pp. 29-38, at p. 31; Peter F. Stevens, *The Development of Biological Systematics: Antoine-Laurent de Jussieu, Nature and the Natural System* (Columbia University Press, New York, 1994), at p. 63.

[114] J. E. Smith (ed.) *A Selection of the Correspondence of Linnæus and other naturalists, from the original manuscripts*, 2 vols. (Longman, Hurst, Rees, Orme and Brown, London, 1821), vol. 2, at p. 578.

[115] See Miller (1983), *op. cit.* (note 19). After Banks's death in 1820, it was left to Humphrey Davy to deconstruct the Banksian Learned Empire when it came to institutions such as the British Museum and Royal Society.

[116] Jonas Dryander, *Catalogus Bibliothecæ Historico-Naturalis Josephi Banks* (William Bulmer, London, 1797–1800).

[117] See Carter, *op. cit.* (note 43), at p. 224.

[118] Jonas Dryander, *Catalogus Bibliothecæ Historico-Naturalis Josephi Banks* (William Bulmer, London, 1797-1800), volume 3, Botany Manuscripts, MSS MANKS COLL DRY, NHM, London, at f. 622 [p. 421]; André Thouin, 'Note sur la culture des Patates et des Pommes de terre', *Annales du Museum d'Historie Naturalle*. **3** (1804), pp. 444–450.

[119] Dryander, *op. cit.* (note 118), at f. 622 [p. 421].

[120] For more on Lindley's career, see: Shteir, *op. cit.* (note 113), at pp. 31-33.

[121] Dryander, *op. cit.* (note 118), f. 622. These papers included Thomas Andrew Knight's 'On the Culture of the Shallot, and some other bulbous rooted Plants' and John Williams's paper 'On the Cultivation of the Vine in Forcing

Houses, with Observations on Forcing Peaches', published in *Transactions of the Horticulteral Society of London*. **2** (1822), at p. 97 and pp. 108–113.

[122] John Lindley, *Rosarum Monographia; or A Botanical History of Roses* (James Ridgeway, London, 1820); John Lindley, *Observations on the Structure of Fruits and Seeds; Translated from the Analyse du Fruit of M. Louis-Caude Richard* (John Harding, London, 1819).

[123] John Lindley to Robert Brown, October 10 1819, Robert Brown Correspondence, NHM, London, vol. 1, f. 26. At this time, Lindley was in Norwich visiting James Edward Smith who gave him permission to examine the Linnaean collections.

[124] It must be noted that not all of Banks's manuscripts went to the British Museum. Much of his correspondence and important documents such as his journals were taken by his descendant, Lord Braboune, and sold during the late nineteenth century.

[125] McOuat, *op. cit.* (note 17).

[126] Müller-Wille, *op. cit.* (note 8), at p. 127.

[127] Richard Pulteney, *Historical and Biographical Sketches of the Progress of Botany in England From its Origin to the Introduction of the Linnaean System* (T. Cadell, London, 1790), at p. iv.

[128] See, for example, Miller (1983), *op. cit.* (note 19); Miller (1996), *op. cit.* (note 19).

[129] *An History of the Instances of Exclusion From the Royal Society, Which were not suffered to be argued in the course of late debates* (J. Debrett, London, 1784), at p. 3.

[130] Silliman, *op. cit.* (note 10), at p. 293.

[131] McOuat *op. cit*. (note 17); Christophe Bonneuil, 'The Manufacture of Species: Kew Gardens, the Empire, and the Standardisation of Taxonomic Practices in Late Nineteenth-Century Botany', in *Instruments, Travel and Science: Itineraries of Precision from Seventeenth to the Twentieth Century* (ed. Marie-Noelle Bourget, Christian Licoppe and H. Otto Sibum), pp. 189–215 (Routledge, London, 2002).