

Abstract. When sent as a pharmacist to the Philippines in 1688, the Bohemian Jesuit Georg Joseph Kamel turned to the local nature to identify resources, which he could use in his practice. Remarkably for a Jesuit of his low rank, Kamel soon entered into communication with European scholars and exchanged knowledge and materials with figures both in the Indies and Europe, namely Willem ten Rhijne (1647-1700), a Dutch botanist in Batavia; English surgeons in Madras; and two members of the Royal Society, the apothecary James Petiver (c.1665-1718) and the naturalist John Ray (1627-1705). Based on an analysis of the letters and consignments involved, this article provides an insight into the construction and operation of long-distance networks of knowledge exchange based on factors other than nationality and spanning geopolitical, social and confessional boundaries. Attention will be drawn to the associations between early modern colonial science and trade and, in particular, the role of local merchants as go-betweens. It will be shown how commercial routes provided the infrastructure for knowledge circulation; how agents who travelled by way of established networks of trade mediated material exchange on a global scale; and how intellectual and social incentives, as well as the etiquette of correspondence played a pivotal role in the formation and maintenance of Kamel's correspondence network. Furthermore, in tracing knowledge exchange restricted to the colonial periphery and highlighting the agency of actors stationed overseas, this article contributes to the recent efforts to think beyond national and imperial narratives and re-examine colonial history from the view of the peripheries.

Keywords: natural history, medicine, knowledge circulation, Jesuits, James Petiver, John Ray

In 1688, the Bohemian Jesuit lay brother Georg Joseph Kamel¹ arrived with a missionary contingent of the Society of Jesus in the Philippines, then a colony under the Spanish flag. He was assigned to the central Jesuit College in Manila where, as a trained apothecary, his task was to run the local pharmacy and look after the health of his fellow Jesuit brothers. These duties soon led Kamel to explore local nature, the specimens of which he began to collect, examine and document in order to

* University of Cambridge, Department of History and Philosophy of Science, Free School Lane, Cambridge, CB2 3RH, UK. E-mail: sk796@cam.ac.uk

identify resources that he could use in his practice. Due to his diligence and growing expertise, his reputation soon spread beyond the Philippine Islands, and by the late 1690s Kamel found himself engaged in a correspondence network extending from New Spain to London and including figures such as Willem ten Rhijne (1647-1700), a Dutch physician stationed in Batavia; the English apothecary James Petiver (c.1665-1718); and most prominently, his compatriot John Ray (1627-1705), both of them members of the Royal Society.

The objects and information communicated among these individuals were mostly related to the study of plants. At the turn of the eighteenth century, nevertheless, botanical expertise and practice were firmly embedded in medicine, pharmacy and horticulture. While the latter required familiarity with the conditions under which plants can be grown and transplanted, the interest of physicians and apothecaries in nature – medicinal herbs in particular – was dictated by the need to grasp the curative properties of *materia medica*, as well as by the shift in the foundations of medical learning from philosophical disputation to investigation of nature (Cook, 1996; Schiebinger and Swan, 2005; Cook, 2012). The concern with plants, which Kamel shared with his correspondents, was therefore largely determined by their professional vocation.

Reflecting the pivotal role that the exchange of letters and specimens played in the early modern practice of natural history, Kamel's correspondence network constitutes the main focus of this article (Figure 1). In analysing the pertinent letters and consignments, I shed light on the sorts of information and objects which were mobilized within this structure, how and why. Concerned with the relevance of trade routes, correspondence etiquette and, especially, intellectual and social incentives in forming the relationships the network relied upon, such an approach provides an insight into the construction and operation of long-distance networks of knowledge exchange at the turn of the eighteenth century.

Furthermore, Kamel's involvements with English and Dutch correspondents allow this study to move beyond national histories of science and, in response to recent pleas, consider interactions in a network based on factors other than nationality (Arnold, 1996, p. 11; Secord 2004, p. 669). In this regard, Kamel's case highlights the importance of associations between early modern colonial science and trade. While pre-existing networks of voyage and commerce provided the infrastructure for the circulation of knowledge and objects across geopolitical frontiers, it was the merchants and ship's surgeons who travelled within these networks who tended to mediate the material exchange between the distant and culturally disparate spaces. Therefore, this work offers a modest contribution to the recent scholarship concerned with the role of go-betweens in the formation of natural knowledge (Schaffer et al., 2009).

Lastly, Kamel's endeavours will be discussed in the context of recent attempts to recover the agency of peripheral actors. In tracing the circulation of knowledge both between 'local'

communities in contact zones and across the whole globe, historians of science have revealed a bustling traffic of ideas and a complexity of intercultural encounters at the colonial periphery.² Consequently, it has been asserted that the subjects relied upon by metropolitan scholars were not mere gatherers who passively submitted information, but had their own agendas which inevitably affected their activities.³ In keeping with these efforts, this article argues that although Kamel happily provided his friends in London with the fruits of his work, he did not merely submit information to the European metropolis. Just as he contributed to the programmes of centrally-located scholars such as Ray and Petiver, the Jesuit took advantage of his correspondents to obtain objects that suited his own, Philippine agenda. This paper thus invites a reassessment of the flow and accumulation of knowledge by arguing that its transmission relied on the decisions which colonial actors made themselves.

Georg Joseph Kamel SJ and his Philippine mission⁴

Born in 1661 in Brno in Moravia (today's Czech Republic) to an Austrian father and a Moravian mother, Kamel was educated at the local Jesuit College, finishing his studies in pharmacy in 1679 and entering the Bohemian Province of the Order as a lay brother in 1682.⁵ After completing his three-year long novitiate in Brno in 1685, he was sent as an assistant pharmacist to the College in Jindřichův Hradec, but was soon promoted and moved to Český Krumlov in 1686.⁶ On both occasions, his work was very positively reviewed in the Society's triennial catalogues and, therefore, when Kamel applied to be sent to the Jesuit overseas missions at the turn of 1686, there were good reasons to grant his request. Through Cádiz and New Spain, Kamel reached Manila in 1688 where he was assigned to the local Colegio Máximo de San Ignacio (Murillo Velarde, 1746, p. 393v).

According to the available sources, upon his arrival Kamel established the first Jesuit pharmacy in the Philippines,⁷ to which he soon added a 'garden which [he] has planted, consisting entirely of rare and medicinal herbs' (Murillo Velarde, 1746, pp. 393v-394r).⁸ His first months in the new environment were marked by the confrontation with the stark reality of the missionary life, as his note from 27 June 1690 indicates.⁹ In it, Kamel complained that in the unfamiliar Philippine environment, he had little use for the pharmaceutical methods he had learned at home, which considerably complicated his work.¹⁰ Reliance on local resources thus became a necessity, and Kamel's blunt conclusion only served as a catalyst in his efforts to explore his immediate natural environment for alternative sources of remedies and to acquaint himself with the local traditions of knowledge and practice.¹¹ In the following years, therefore, Kamel 'fully devoted himself to the study of the many medicinal herbs that grow in these islands' and 'drew their roots, leaves and fruits, and included their names in different languages, for more general utility' (Murillo Velarde, 1746, p. 393v; Figure 2). Ultimately, he became so familiar with the Philippine flora that he could claim in his letter

to John Ray from 28 October 1700 that 'although Thomas Bartolin notes that Europe is in no need of exotic resources, the Indies have far less need for European ones' (Lankester, 1848, p. 377).

Jesuit historians remember Kamel as a hard-working, skilful and diligent apothecary, through whose labours and expertise the pharmacy of the Jesuit College in Manila soon became the most reputable one in the Philippines. Father Pedro Murillo Velarde portrayed his deeds in a brief eulogy, describing him as 'a perfect example of obedience, humility, poverty and religious observance', and recounting how 'the doors of the pharmacy were always wide open to the poor', how 'during an epidemic [...] the care which he lavished on the sick was extraordinary', how 'he sent medicine and drugs even to the natives and poor people of the Visayan islands' and how if 'someone committed a slip of the pen, or [...] prescribed a bigger dose, [...] the brother would alter the prescription, reducing it to the proper dosage' (Murillo Velarde, 1746, pp. 393v-394r).

Regardless of how purposely embellished these accounts may be, Kamel's stature was quickly growing: in 1696, his superior and compatriot Paul Klein hailed his abilities in a letter home to Bohemia, claiming that Kamel enjoys 'eminent praise for his happy outcomes of medical treatment' (de Boye, 1702, pp. 35-36). This epistle also reveals that in addition to work in the pharmacy, where he would prepare remedies based on his knowledge of *materia medica*, Kamel fulfilled the role of a physician, prescribing doses and regimens.¹² Kamel's reputation soon extended even beyond the Philippine Islands, and sometime in 1696 he received a letter from James Petiver, a London-based apothecary and member of the Royal Society. In replying, Kamel became the newest recruit to the Englishman's far-flung correspondence network and, remarkably for a Jesuit temporal coadjutor, earned citizenship in the so-called *Respublica litteraria*.¹³ Two factors, in particular, played a pivotal role in bringing Kamel together with his correspondents: commercial networks provided the infrastructure for their exchange, and scholarly ambitions acted as the main incentive for both sides. Their interaction, moreover, illustrates that the early modern production of natural knowledge was firmly embedded in scribal exchange or, in the circulation of manuscript treatises, letters, and lists of specimens and *desiderata* (Yale, 2009, 2011; Pugliano, 2012).

James Petiver, 'a man of greater correspondence in Africa, India, & America than any one'¹⁴

These commending words of John Ray present a most fitting description of Petiver's endeavours.¹⁵ Despite his humble origins and lack of higher education, Petiver's ambitions and diligence earned him a successful professional career, respect among the greatest scholars of his day and active membership in the Royal Society. His rise to eminence was closely associated with Hans Sloane, with whom he shared both a professional bond and a passion for natural history and whose friendship he won in the local Temple Coffee House Botany Club, which they both frequented. This powerful ally introduced Petiver to his learned friends and correspondents, encouraged him (both as

a friend and patron) in his natural-historical activities, and also recommended him to membership of the Royal Society and to the prestigious position of the apothecary of the Charterhouse.

Petiver's interest in the natural world and collecting was a logical extension of his medical profession; botanical and other specimens were, after all, the ingredients used in the production of drugs.¹⁶ As Daston and Park (1998, p. 149) have argued, moreover, the attraction of scholars and medical professionals to collecting *naturalia* has to be understood in the context of the new surge of interest in *exotica* and natural wonders, which contributed to 'the emergence of collecting as an activity not just of patricians and princes'. Collecting was also explicitly associated with the new Baconian programme of investigating nature, which emphasized practice, active observation and systematic collection of data (Smith and Findlen, 2002, p. 3). Bacon (1688, p. 35) himself recommended that every learned man should own 'a goodly huge cabinet, wherein [...] whatsoever Nature hath wrought [...], shall be sorted and included'. Lastly, as Swan (2007, p. 204) has suggested, possession of *naturalia* was employed to advertise knowledge of nature *per se* and, therefore, scholars and medical professionals often sought 'social legitimation through collecting'.

In acquiring the specimens for his cabinet and his studies, Petiver relied on his worldwide network of informants and acquaintances. Only large-scale cooperative collection and comparison of *res naturae* could advance natural knowledge and contribute to the ultimate objective of producing a complete inventory of all species and their medicinal, commercial and industrial uses – and the newly discovered regions of the globe offered a wealth of unknown material. Mastering the discipline of recruiting and maintaining reliable collectors and correspondents, Petiver built – in John Ray's words – 'the greatest correspondence both in East & West Indies', which helped him gather an equally vast collection of specimens (Gunther, 1928, p. 279).¹⁷ Of particular importance in these labours was the way Petiver used the naval routes of British commerce and those who moved within them.

The explosion in mobility related to the European exploratory, colonial and trading activities is widely considered one of the defining features of the early modern period. This intensive movement on a global scale involved people, goods and natural resources, but obviously also knowledge, instruments and reports of scholarly value. In tracing and analysing these networks, historians of science have examined questions related to how science travels and emphasized the close associations between early modern scientific, colonial and commercial practices. More specifically, their works highlight the proliferation of commercial oceanic voyages arising from the European colonial enterprise as one of the crucial factors that shaped the production and mobilization of colonial knowledge, as it created lines of communication through which information and objects could be exchanged on a global scale.¹⁸

This mobility of knowledge was typically built around specialized corporations engaged in overseas activities, whether they were religious organizations such as the Society of Jesus, state

colonial agencies such as the Spanish Casa de Contratación or trading companies such as the Dutch East India Company and the East India Company.¹⁹ Unable to access or exploit Jesuit networks and lacking the centralized state sponsorship of France and Spain, English (and Dutch) scholars sought alliance with trading companies.²⁰ This was in consonance with the Baconian programme of new science that the early Royal Society adopted. Inspired by Bacon's incentive to acquire knowledge from nature and the world itself rather than from books and scholastic contemplation, the Society fully acknowledged the importance of global voyages for 'the further proficiencie and augmentation of all sciences' and embraced travel as a crucial component of its learned agenda (Bacon, 1605, p. 122). In their quest for information from all over the world, its members turned to England's growing overseas trading networks.

For Petiver, therefore, reliance on travel formed a part of a wider natural-historical agenda, while networks provided an infrastructure allowing long-distance communication and circulation of knowledge and objects, which he could exploit in his endeavours. But since specimens would not fetch themselves, Petiver had to recruit people who travelled within these networks. In this regard, his target group were the ship's surgeons and, to a lesser extent, captains.²¹ This was an obvious choice, as they were typically the most educated men on the ship, enjoyed highest authority and freedom of movement and were closest to the social status of a credible gentleman, all of which were essential qualities for the completion of Petiver's tasks. The surgeons' medical occupation, moreover, dictated their interest in natural history, medicinal plants in particular, while – due to their control over the people and physical spaces on the ship – the favour of captains was often crucial for the survival of the specimens (Stearns, 1952; James, 2004; Murphy, 2013). Furnishing Petiver with their own collections, but also striving to recruit new collaborators and acting as couriers between Petiver and his terrestrial connections, these individuals thus operated as brokers in Petiver's network, as they constructed new relationships and mediated the movement of information and objects.

Petiver directed the choice of his collectors with lists of *desiderata* and supplied them with 'plain, full & easie directions' for how to collect and preserve specimens, as well as with learned books in which he hoped they would find 'a pattern to imitate'.²² In exchange for their services, these men received gifts of diverse nature, ranging from goods or books to free medical advice. The relationship therefore worked on a largely reciprocal basis. Petiver's greatest weapon in recruiting and retaining his men, however, was their own intellectual ambition. To borrow terminology from Bourdieu (1973), there was substantial 'cultural capital' at stake in collecting, both for Petiver and his men. As for the Englishman, possession of *naturalia* as such already had some worth in social currency but, as argued, also publicised the owner's knowledge of exotic specimens and ingredients, and was therefore tied directly to pharmaceutical practice. As for his collaborators, collecting for

Petiver presented opportunities to accumulate social credit through the involvement in the wider natural-historical enterprise. An acknowledgement for the discovery of a new species was a strong currency, as was seeing one's name in print or boasting membership in a world-wide community of naturalists, including England's learned authorities and fellows of the Royal Society. As Meredith (2009, p. 160) has argued, 'one's correspondents were testimony of how one was judged by others' and 'a customary means of establishing status in a community of practitioners'. The capital thus obtained could lead to a considerable growth in status, as in the case of James Cuninghame, an East India Company surgeon and Petiver's correspondent in China, who was elected a member of the Royal Society for his endeavours in Petiver's service (Stearns, 1952, p. 26; for Cuninghame, see: Santos-Guerra et al., 2011; Jarvis and Oswald, 2015).

In managing this cultural capital, Petiver relied on his series of periodicals: *Musei Petiveriani centuriae* [Centuries from Petiver's cabinet] (1695-1703) and *Gazophylacium naturae et artis* [The treasure-house of nature and art] (1702-1709). Conceived as both an inventory and promotion of the cooperative effort to amass and catalogue all natural knowledge, Petiver's periodicals contained lists of *naturalia*, each with a brief description, original location and – later in *Gazophylacium* – also an illustration. The collectors were remunerated with acknowledgements, which appeared alongside every specimen (Figure 3). Petiver also made sure that both his own and the available cultural capital were well-advertised: promising 'many things New and very Rare' upon subscription in his introductory 'Advertisement', Petiver declared that any specimens sent to him, he 'will publish to the world with a grateful & just acknowledgment of you, their first Detector' (Petiver, 1702). Furthermore, the apothecary hoped that the 'Generous Example of these Curious Persons, will excite and encourage others, who Travel to or Reside in Foreign Parts, to do the like for me' (Petiver, 1699, p. 47). The periodicals thus functioned as a showcase of Petiver's status and extensive correspondence, as well as an appeal to potential patrons and new collectors. The foundation of *Gazophylacium*, which was – as opposed to *Musei* – richly illustrated, testifies to the success of Petiver's enterprise; and perhaps also to his effort to better target the audience of *virtuosi*. To cover the costly fees for copperplates, accordingly, each of his tables was 'humbly dedicated' to a current or potential patron. Thus, provision of specimens, funds or other related services was repaid by incorporation of the collectors and other benefactors within a broader community of learned and curious men centred around Petiver's periodicals and designed to advance the studies of nature.

Surgeons, merchants and the etiquette of scholarly correspondence

The interdependence between Petiver's correspondence and publications required a constant supply of new, exotic specimens that would satisfy the hunger of both his readers and himself. Therefore, Petiver continually spurred his traveling agents to recruit new collectors and thus

ensured that the extent of both his network and collection was ever-growing. One of these initiatives linked Petiver with Kamel. The origin of their correspondence fits neatly into the picture outlined in earlier paragraphs. The key figure connecting Kamel and Petiver was Samuel Browne (d.1698), an East India Company surgeon permanently stationed in Madras, who was recruited by Petiver in 1689 through their mutual acquaintance, the ship surgeon Richard Sambach (Winterbottom, 2010, p. 74). After Petiver's initial enquiry and a complimentary gift in the form of a book on English botany, the pair engaged in a long and fruitful correspondence which relied upon other, more mobile surgeons traveling between England and Bengal in the services of the East India Company, and which lasted until Browne's death in 1698.²³

Although the earliest letters do not survive, an epistle from January 1699 from Kamel to Ray sheds light on how the communication link between London and Manila was established: '[In 1696], I received a letter from Mr Samuel Browne and a catalogue sent by Mr J. Petiver: in it, since Mr Samuel Browne learned in Mylapore from merchants of Manila that I had been assembling illustrations of the plants of Luzon, he inquired whether I would share them with him'.²⁴ These words point to the importance of commercial links and hearsay in establishing new scholarly connections, but also reveal some of the conventions involved in this process. As Goldgar (1995) has argued, early modern scholarly correspondence had its unwritten code and communal standards, and one such rule was what Spary (2000, p. 77) termed 'the system of polite indebtedness'.²⁵ Relying on the principle of reciprocity, the initiator of the correspondence was to enclose a 'gift' – such as the aforementioned 'catalogue sent by Mr J. Petiver' – which, upon reception, would invoke a feeling of polite obligation to reply.

Another important tool was the mutual use of the language of virtue. Although it would gradually disappear from the correspondence once the relationship had been established, its appearance in introductory letters was crucial, as Petiver's ending from February 1702 demonstrates: 'To conclude, I beg you again and again to recognise me as worthy of your trust, when I say that I am and will be, most dignified Sir, with all observance your most devout and humble servant'.²⁶ The language of communication between Kamel and London was Latin, the *lingua franca* of scholarship, although Petiver must have written the initial letters in English, since the Jesuit asked him 'to write in Latin, since I have with difficulty found anyone to translate your more recent letters for me; I do not understand the previous ones at all, except for some words similar to the German idiom'.²⁷ With Browne dying in 1698, however, the link's existence was threatened before any firmer foundations had become established. Fortunately, Edward Bulkley (c.1651-1714), a fellow East India Company surgeon with an interest in natural history, assumed his place in the network.²⁸

Besides acting as a conduit between Kamel and Petiver, the Madras surgeons were engaged in correspondence with the Bohemian on their own behalf. The sole surviving letter from this

exchange, addressed in January 1699 to Browne and written unusually in Spanish, indicates how the pair dealt with the problematic connection between Manila and Madras. Throughout the early modern period, England and Spain were not on the best diplomatic terms and although the East India Company repeatedly tried to obtain permission to enter the lucrative Manila market, where silver from South America was traded for Chinese silk and other luxurious goods, its efforts ultimately failed (Quiason, 1963). In spite of that, a bustling surreptitious trade developed between the English and Spanish, as the merchant Thomas Bowrey recorded in his late-seventeenth-century report of the Bay of Bengal: 'great Stores are transported and vended into most places [...] belonging to the King of Spaine, but are sent thither in the name and under the Colours of the Portugals borne and bred in India; noe others being admitted a free trade thither, and especially the English' (Bowrey, 1905, p. 5).

As Bowrey's account reveals, the East India Company sought assistance from merchants of other nationalities who had free access to Spanish colonies – typically the Indo-Portuguese, Hindus and Armenians (see also Winius, 1994). To enter the Manila market, the company would therefore employ foreign vessels or, alternatively, dispatch its ships under non-English names and foreign command. Kamel's letter to Browne, accordingly, mentions a courier called 'Gody Ignatio, the Armenian' and another consignment sent through the Portuguese in Macao.²⁹ In providing this connection, the merchants of Asian origin acted as go-betweens mediating the relationships and exchange between disparate, in this case English and Spanish territories.

'Desire for exchange of botanical matters'³⁰

For Petiver, Kamel represented an addition to his network which was central to his natural-historical efforts of collecting vast quantities of specimens, both to advance the knowledge of nature and to promote this monumental enterprise (as well as his own reputation) through his periodicals. A connection in the Philippines, the curious land forbidden to the English, whose natural riches were largely unknown to European scholarship, was particularly precious to Petiver, as this excerpt from *Gazophylacium* indicates: 'The Reverend and Learned Father Kamel [...] hath again very lately been pleased to favour me with many Additions, new Observations and Delineations [...]. Several of these I have already Figured in my Gazophylacick Tables, and shall continue them, if this Curious Age will give encouragement; which is humbly hoped, since there are in them many Discoveries in all Parts of Nature, which hitherto was never known to Europe' (Petiver, 1702, p. 63). Furthermore, although Petiver's impatience led to numerous quarrels with his correspondents,³¹ some of whom were too often unable to follow instructions that 'any child of 6 years old is capable of doing',³² his conduct towards Kamel was always exemplary. He held the Jesuit in great regard, confessing to Browne how 'very proud of a Correspondence with him' he was.³³

As for the Jesuit, his engagement in the correspondence had both practical and intellectual consideration. Kamel's work in the Philippines – his duty to run the local pharmacy and look after the health of his fellows – was hampered by the unfamiliar Philippine environment, and the poor supply of resources from Spain and its colonies. The Philippines were located at the periphery of the Spanish empire, which concentrated its attention on its possessions in America, as the latter were also significantly richer in natural resources. In an official communiqué to the Dutch East India Company board of directors, the council of Batavia remarked that 'the Philippines are more of a burden than a profit to the Castilian king' (Laarhoven and Wittermans, 1985, p. 488). In view of that, for Kamel finding an alternative connection to Europe and an experienced botanist in the local area promised the opportunity to acquire new books, knowledge and specimens that he could use in his practice.

Probably for identical reasons, Kamel's superiors did not prevent him from entering into correspondence with those who were, in fact, enemies in both faith and politics. Since the secrecy of knowledge was a major issue in early modern colonial efforts, this situation is rather unusual. Although commercial links provided the infrastructure that could easily move people, knowledge and materials around, there was no idyllic, free flow of information, as the exchange was generally restricted by political and economic interests.³⁴ Cook (2007, pp. 323-324), for instance, mentions the case of Hendrik Claudius, sent in 1682 to the Cape where he worked for the Dutch East India Company as an illustrator of plants. After sharing his map and figures with a group of passing Jesuits who later published it in Europe, he was accused of treason and removed from the colony. How, therefore, did Kamel avoid a similar fate? It seems likely that he had an ally among the local Jesuit directorate who helped Kamel to disguise his endeavours from the Spanish authorities as efforts to ameliorate the state of his pharmacy. This scenario is indicated in one of Kamel's letters where he speaks of 'the College Rector Father Martinus Sola, who generously supports my poor workshop [i.e. pharmacy]'.³⁵

There was also a clear intellectual incentive behind Kamel's participation in the network. He explicitly expressed his 'desire for exchange of botanical matters' in one of his letters, while elsewhere he would 'profoundly beg you [Petiver] to kindly point out any errors that may here and there occur in the treatises I have sent you'.³⁶ For a lay brother, Kamel showed unusually strong scholarly ambitions and the link with London presented him with a unique opportunity to fulfil them, of which the Bohemian's correspondence with John Ray offers a particularly good illustration. Although the earliest letters between Kamel and Ray have not survived, it appears that it was entirely Kamel's initiative that brought the two together. As the Jesuit wrote to Ray in January 1699, he was familiar with Ray's *opus magnum Historia Plantarum* [History of plants] (1686-1688) which he 'saw at a friend's several years ago' and which he considered 'a work supremely brilliant, for which all posterity will give you deserved credit'.³⁷ When Kamel received Petiver's consignment from London

in 1696, where he knew that *Historia* was published, it seems that he got the idea to approach its author in search of an intellectual exchange (and a copy of the book). Perhaps he had heard, maybe from Browne, that Petiver knew and worked for Ray; or perhaps it was a shot in the dark.³⁸ Either way, when Kamel's first shipment arrived in London in 1698, Petiver wrote to Ray that 'there is a letter from Padre³⁹ George Camelli a Jesuit at Manilla addressed to you', and asked Browne in Madras to inform Kamel that 'that Mr Ray has his Letter and Papers and hath promised me to answer them'.⁴⁰

When Kamel heard from Browne that Ray was preparing the third volume of his *Historia*, he decided to compile all his descriptions and illustrations of the Philippine plants and proposed to Ray to insert them into his upcoming publication, calling it a 'Supplement to your *Historia*, compiled from a miscellany of Luzon plants'.⁴¹ Ray welcomed Kamel's contribution, replying that 'I am greatly obliged and indebted to you for this most magnificent and welcomed gift', and confessing to Sloane that the *Supplement* 'would be a very great advantage and ornament to my work'.⁴² Kamel's work duly appeared as an appendix to the third volume of *Historia*, published in 1704 (Figure 4). Kamel's correspondence with John Ray in particular therefore demonstrates that the Jesuit was not just a passive element in Petiver's network, but actively shaped it and used it for his own purposes, seeking his own fortune. Driven by scholarly ambitions, it seems that he ventured to approach a leading naturalist of the period and convinced him to include his work in a major botanical publication – a feat unusual for a Jesuit lay brother.⁴³

Kamel's *Supplement*: pirates, the Dutch connection and the importance of illustrations

The fate of Kamel's appendix to *Historia* epitomises the hardships experienced by colonial collectors, particularly the hazards of the transoceanic transport and the lack of acknowledgement in Europe.⁴⁴ After compiling his *Supplement* to Ray's *Historia*, where he systematically ordered his descriptions and illustrations of the Philippine flora, Kamel shipped the resulting volume to London in January 1698.⁴⁵ Unfortunately, as he later recounted to Ray, 'the ship was assailed by pirates and the evidence of ten years of my work, I fear, was lost in a single day'.⁴⁶ Undaunted by this tragedy, Kamel begged Ray for patience and resumed his work. Already in January 1699, he sent to Browne the recreated first section of his *Supplement* concerned with 'Plantae humiles' [Low-growing plants]. In the meantime, however, Browne had died and the consignment got stuck in Madras. Kamel then solicited Bulkley's help in looking for the lost shipment, which was eventually forwarded to London by Browne's widow.⁴⁷ It did not reach Ray until spring 1701, with another part of the *Supplement* – 'De fruticibus et arboribus' [On shrubs and trees] – following a year later and arriving in London just in time to be appended to the *Historia*.⁴⁸

Given these problems, Kamel looked for an alternative way of delivering his packets to Europe. Perhaps inspired by Petiver's method, sometime in 1698 he sent a sample of his work to nearby Batavia (now Jakarta), the capital of the Dutch East Indies. Here 'this paper orphan wandered through the streets', before it found its way into the hands of Willem ten Rhijne, a local physician with more than twenty years of colonial practice.⁴⁹ As an experienced botanist who had contributed to *Hortus Malabaricus* (1678-1693), one of the most monumental projects of early modern colonial botany, the Dutchman immediately recognized the value of Kamel's labours and wrote him a letter in July 1698. He declared that 'for almost thirty years, I have been tirelessly searching along these shores for a man well-versed in botanical matters' and hoped that Kamel would 'consent to an epistolary exchange, concerned especially with botanical mysteries'.⁵⁰

In the two letters which have survived from their exchange, both from ten Rhijne to Kamel, a number of themes in common with the 'Petiver-Kamel link' appear. To entice Kamel into correspondence, the Dutchman relied both on the language of virtue and the system of polite indebtedness, sending the Jesuit a number of complimentary gifts – his commentary on Hippocrates and essays on arthritis and leprosy, but also a booklet of Catholic liturgical sermons –, all 'in anticipation of a firm mutual friendship'.⁵¹ Just as in the case of the link between Manila and Madras, the communication infrastructure relied on commercial vessels. Although the Treaty of Münster (1648) explicitly forbade the Dutch to enter Spanish ports, local merchants covertly circumvented these bans, using the same techniques as their English counterparts (i.e. trade mediated through other nationalities and territories which had access to Spanish possessions; Laarhoven and Wittermans, 1985).

In the second letter, dating from August 1699, ten Rhijne lauded the work that the Jesuit had sent in the previous consignment and openly offered his help in Kamel's 'effort to forward these botanical manuscripts to Europe for publication'.⁵² Based on subsequent correspondence between Kamel and his English fellows, it can be assumed that he did so. In a letter dated to 28 October 1700, the Bohemian informed Ray that he could not send him any further papers on the Philippine flora, as he had submitted all of them to ten Rhijne instead (Lankester, 1848, p. 377). Ray did not hide his disappointment when he found out, complaining to Petiver in February 1702 that 'Father Camelli hath not dealt ingenuously in delivering his icons and descriptions [...] to another' (Lankester, 1848, p. 404). In shipping them to ten Rhijne, however, Kamel only extended his streak of bad luck, as the Dutchman never relayed them to Europe: he died in June 1700, probably before Kamel's package even reached Batavia. Although Kamel succeeded in recovering the strayed consignment, he lost precious time and did not manage to deliver it to London in time for it to be included in Ray's *Historia*. This is why Kamel's volume 'De plantis scandentibus' [On climbing plants] was omitted from the work and, instead, later published by Petiver in the *Philosophical Transactions* (Kamel, 1704a).

Nevertheless, Kamel's greatest tragedy was that the *Supplement* appeared without his illustrations.⁵³ His bare descriptions alone had little value for botany, as they lacked any point of visual reference that would allow any sort of identification or comparison. Where Ray – who was most qualified to judge – saw a man who 'deserves to be by all means obliged [...] for the advancing of natural knowledge', other botanists could hardly find any practical use.⁵⁴ Ray's regard for Kamel and his work is apparent from a letter addressed to Hans Sloane: 'I cannot but look upon it as an effect of Providence to stir up a man so well skilled in plants to apply himself to the inquisition, delineation, and description of the plants growing in those remote parts of the world, and giving an account of their virtues and uses'.⁵⁵ Nonetheless, the legacy of Kamel's *Supplement* was summed up by Carl Linnaeus who, despite naming the *Camellia* in his honour (Figure 5),⁵⁶ passed over his work saying 'Imperfect descriptions. No knowledge of flowers' (Linnaeus, 1737, p. xxii). It is not by chance that the few authors who later referred to Kamel's works did not typically cite *Historia* as their source, but Petiver's *Gazophylacium* instead, where a number of Kamel's drawings were printed (Cf. Linnaeus, 1753, pp. 35, 110, 635, 835, 953).

Kamel himself was well-aware of the importance of the visual aspect of his work and showed particular concern about the publication of his drawings, enquiring of both ten Rhijne and Petiver if they had heard whether or not Ray planned to include his illustrations in *Historia*.⁵⁷ As Ray wrote to the Jesuit in May 1701, he was certain that Kamel's 'most beautiful drawings are worthy of publication', but afraid that 'due to the costs of the copperplates, I will hardly succeed', promising nevertheless that 'I will do whatever is in my powers' to publish them.⁵⁸ As Ray confessed to Petiver in February 1702, he was considering 'getting them graven by a subscription' (Lankester, 1848, p. 404), but in the end, financial circumstances did not allow the publication of Kamel's illustrations, which condemned the majority of his extensive findings to relative obscurity.

Books, plants and commodities

In exchange for providing Ray and Petiver with his drawings and descriptions of Philippine nature, Kamel besought scholarly works in particular. For colonial botanists and apothecaries, printed works were absolutely essential, as they facilitated the identification and cataloguing of specimens, as well as the production of remedies and the selection of appropriate forms of treatment. Nevertheless, since their transport from Europe was problematic, particularly due to high taxes, books were desperately scarce and costly commodities in the Indies. In seeking access to printed works, therefore, peripheral botanists were frequently dependent on the help of their metropolitan colleagues.

A list of book *desiderata* submitted by Kamel to Petiver confirms his interest in pharmaceutical, medical and botanical publications: he requested, for example, Thomas Burnet's

Thesaurus Medicinæ Practicæ [Treasury of practical medicine] (1673), a true compendium of the medical knowledge of his time; Steven Blankaart's (1650-1704) treatises on anatomy and surgery; and *Phytographia* (1691-1692) an extensive account of exotic plants compiled by Petiver's colleague Leonard Plukenet.⁵⁹ For many of the works, Kamel included the year of publication or the sections he desired. Since none of the books requested were published before 1688 (when Kamel was already stationed in the Philippines), it seems that despite the distance from Europe, he remained well-acquainted with current scholarship and wanted only the most recent works. Kamel's most desired item, nevertheless, was Ray's *Historia Plantarum*, for which he repeatedly asked both of his London correspondents. Ironically, it appears that he never received it: although Ray addressed him a copy together with some minor publications, the Armenian courier Gody Ignatio did not hand the consignment over, telling Kamel instead that 'they were for him'.⁶⁰ Given the value of books, similar episodes were not uncommon and the bearers would often appropriate or withhold parts of the shipment.⁶¹ In spite of occasional problems, however, Kamel had access to the leading contemporary works, with Petiver's aid.

Apart from books and manuscripts, it was largely knowledge and specimens that were circulated in the networks discussed. The interests of Kamel's correspondents defined the specific nature and content of the exchanges. Kamel's communication with Ray, for instance, comprises a largely intellectual debate on botanical issues. For example, in the letter from 28 October 1700, Kamel considered the classification of a local species, agreeing with what Ray had suggested in his previous letter: 'I suspected that fagara is identical to a species of pseudo-amomum or Clusius's Plinian caryophyllon' (Lankester, 1848, p. 377). As this passage indicates, early modern natural history was still deeply embedded in erudite traditions (Anagnostou, 2005; Siraisi, 2007). In addition to Pliny, a number of other ancient authorities appear in the correspondence, with Kamel referring to Dioscorides or Theophrastus throughout his work and mentioning species as 'Dioscorides's true Amomum' or 'Theophrastus's Sida' to Ray (Figure 6).⁶²

Kamel's communication with other members of the network never reached this level of botanical expertise. The subject of conversations between the Jesuit and Petiver typically revolved around the material side of the exchange – what was being sent and what else was desired –, which reflects the nature of their relationship: for Petiver, the Bohemian was a part of his network of collectors that supplied him with descriptions and specimens, while for Kamel, the Englishman was the main provider of goods from Europe and editor of his manuscripts. When reading their letters and notes, it often seems that one is looking at administrative records rather than at a scholarly correspondence. This, however, can be viewed as perfectly consistent with both apothecary and natural-historical practices of the period. Pugliano (2012) has suggested that lists of specimens and *desiderata* were novel tools which enabled early modern naturalists to cope with a world

increasingly flooded with new objects. For Kamel and Petiver, moreover, similar methods were commonplace, since the daily operations of a pharmacy typically involved the production and use of large volumes of paperwork and handwritten documents. Therefore, while growing in importance in natural history, this scribal culture was already firmly embedded in – and as Pugliano argues, perhaps to an extent arising from – apothecary practice.

Although the surviving correspondence between Kamel and his other contacts – ten Rhijne and the Madras surgeons – is not very extensive, the few available letters indicate that their communication was frequently concerned with pharmacy and medicine. This perfectly reflects their vocational interests: in the world where drug supplies were scarce and both diseases and their cures largely unknown to the European colonisers, a fellow professional was often the best source of information. Kamel did not hesitate to seek advice from his more experienced colleagues, as a letter from ten Rhijne indicates. After learning that Kamel found his recommendation useful, the Dutchman replied: 'It greatly pleases me that the remedy from snake gall against the Asian leprosy corresponds to your wishes'.⁶³ Kamel's letter to Browne, on the other hand, reveals an exchange of knowledge and even specimens of medicinal plants between Manila and Madras: 'you desired me to send you some of the Wood Colubrino Manungal and Cortice Febrifugo Emetico Mananangtang, the one the other I sent you'.⁶⁴ The network in which Kamel was involved thus demonstrates the circulation of information and material not only between Europe and overseas, but also within the colonial world, hence complicating the distinction between the centre and periphery.

Information received from Kamel was also discussed between Petiver and Bulkley. As opposed to Kamel, where intellectual incentives played the key role, their exchange touches on the potential for economic gain, as the surgeon proposed to Petiver that specific remedies mentioned to him by Kamel could be used as commodities in Europe. Among his recommendations were 'the Balimbago Josephi Cameli [...] a good emetic cathart, I think as good as Ipecac and the dose the same. I hope you will make a mercantil commodity of it, that it may have a room in every druggists shop, I have tried it often with good success'.⁶⁵ Bulkley similarly approved of 'the gumm or glewe of the Punsacoy or fruit of the Panitsjakamar' which he believed 'may be of considerable use', adding that 'I should be glad if from what you receive, you may make some profitable discovery'.⁶⁶ In addition to further testifying to the aforementioned circulation of information at the colonial periphery, these excerpts point to the fact that newly acquired medical knowledge was frequently subjected to additional tests and trials (Leong and Rankin, 2011). Furthermore, these examples demonstrate that although Kamel's concerns were largely intellectual, the network with London that he joined was built upon and underpinned by colonial and imperial motives closely linked to utility: the search for new remedies was driven just as much by the effort to keep the colonial personnel

healthy and productive as by the ambition to supply markets back in Europe in the pursuit of profit (Schiebinger and Swan, 2005).

Correspondence at war and the termination of the link

After the War of the Spanish Succession broke out in the early 1700s, John Ray confessed to Petiver on 22 December 1703 that 'I am sore afraid that the wars will interrupt your epistolary commerce [with Kamel]' (Lankester, 1848, p. 439). He was indeed correct: the bustling surreptitious trade between Manila and the English settlements was effectively terminated by the military conflict, paralysing the correspondence link with Kamel as well. As Bulkley complained to Petiver in January 1706, there were 'no ships this year nor last from Maneila, since the war with Spaine we can not send ships to Maneila', saying that 'I much lament our hinderd correspondence'.⁶⁷ It seems, however, that Kamel managed to smuggle his shipments through to Madras despite these complications, as Bulkley relayed at least one consignment a year to London between 1705 and 1707.⁶⁸

During the war, the exchange seems to have depended on occasional trading ventures of the neutral Armenians.⁶⁹ However, the connection was far from regular, as Petiver's epistle to Kamel dated to February 1708 indicates: 'Your very Acceptible Letter of October 15, 1704 came safe to my hands tho not till January 13, 1707'.⁷⁰ Under these circumstances, both Petiver and Kamel were growing impatient. The Jesuit's disappointment is apparent in his letter as he expected to receive more from London, reminding Petiver that 'whenever an occasion arose, I did not fail to serve you', but promising that 'I will not fail to write to you in future'.⁷¹ Petiver in his reply swore that 'I have not faild a year of returning you something' and as a proof, he enclosed 'a list of all I have since sent you', since 'nothing can be more acceptable to me then the continuation of the Curious Communications'.⁷² Petiver evidently vented his anger on Bulkley, who defended himself claiming that 'I am sure I never miss any opportunity', but admitting in December 1707 that 'our correspondence with Maneila is allmost spoyled'.⁷³ Two months later, he added that from Kamel, 'I have not heard this 2 years'.⁷⁴ Not that he even could: Kamel died in Manila in May 1706 from diarrhoeal disease, aged 45 (Murillo Velarde, 1746, p. 394r).

Petiver did not find out about Kamel's death until March 1710, when Bulkley forwarded him a brief note from Vincentius Serrano, a Jesuit from Manila, who revealed to the Englishmen the sad news that 'your three letters [...] have found your friend and our most cherished brother Georg Joseph Kamel already dead'.⁷⁵ On behalf of his deceased brother and the Jesuits of Manila, Serrano expressed his 'heartfelt thanks' for the numerous gifts which arrived with the letters and which 'in the name of the deceased, as it befits us to greatly esteem'. Both Petiver and Bulkley deeply mourned the loss of 'the incomparable G. C.', to whom 'the learned World have been very much obliged [...] for his Kind Communications of the many Observations [which] enlightned our European

Quarter of the World'.⁷⁶ Petiver, in his reply to Bulkley, 'would not slip this Opportunity of heartily condoleing with you the loss of our late most Curious and Learned Friend Father Kamel [...]. I cannot easily express how much the Publick and particularly my selfe are concerned at this great Mans Death'.⁷⁷

Their grief, however, was rapidly followed by more practical concerns of whether anyone in Manila could fill Kamel's empty shoes; as Petiver put it, 'what most alleviates our loss of soe great and good Friend is in the hopes you give me of suddenly having some other Persons as well qualified to succeed him'.⁷⁸ In this regard, Serrano's letter seemed particularly promising: 'we are in hope that it will not take long before another apothecary from among our brothers arrives to the Philippine Isles, who would – like the deceased Georg – have knowledge of the plants of these regions'.⁷⁹ Encouraged by this hopeful news, Petiver wrote two letters to Serrano in March 1710 and January 1711, in which he enquired of further collaboration, as well as of whatever there was left from Kamel's estates.⁸⁰

The Englishman attended to his proven method of 'bribing' the recipients of his consignments into correspondence, promising to furnish 'what ever you desire' from Europe and enclosing complimentary gifts.⁸¹ Aware that the new pharmacist might not yet have arrived, Petiver also enclosed 'some printed directions for the easie making and Preserving Collections of all Naturall Curiosities according to which' he begged Serrano to 'employ some poor Body, once or twice a Week to go into the Woods and Fields to pick up what ever they meet with particularly all Plants, Shells and Insects'. However, despite these efforts, Petiver never received a reply from Manila. In January 1712, Bulkley informed him that 'Padre Serrano is removed to some other place' and conceded 'little likelihood of any further correspondence with that place'.⁸² After receiving this news, Petiver made no further attempts.

Conclusion

At the plenary lecture of the Three Societies Meeting in 2004, James Secord declared that the field of history of science 'need[s] unifying narratives and a sense of large connections' (Secord, 2004, p. 656). Although writing a largely biographical case study of an obscure Philippine botanist may at first seem contradictory to this plea, it is precisely 'a sense of large connections' that ultimately emerges from Kamel's correspondence. For this account is pervaded by the links between early modern science and commerce: the trade networks that, despite their limitations, provided the infrastructure without which knowledge and materials could not circulate on a global scale; the merchants and surgeons who travelled within them and brokered relationships between disparate geographical and cultural contexts; and the concerns with commodification and profit which underlay colonial botanical endeavours.

Furthermore, in the diversity of Kamel's activities, a religious mission was united with medicine, pharmacy and natural history. Ties between apothecary practice, collection of *naturalia* and long-distance travel, moreover, become apparent in Petiver's ventures, as illustrated by his programme of natural history reliant on 'collecting' acquaintances and, through them, information and specimens. Petiver's monumental enterprise of advancing natural knowledge entailed masterful handling of the cultural capital that was at stake in collecting. In exploiting this resource, Petiver emerges as not merely a pharmacist, but also as a skilled natural historian, proficient correspondence manager and a competent editor and publisher. Central to the interaction between Kamel and Petiver, then, was the relationship between correspondence, global contexts and apothecary vocation. Epistolary exchange, which enabled them to participate in the global 'commonwealth of learning', was in fact a constitutive part of being a pharmacist, or of the scribal culture that was deeply embedded in the daily pharmaceutical practice. Viewed together, finally, the multifaceted efforts of Kamel and Petiver contribute to the larger picture of natural history at the turn of the eighteenth century.

Lastly, the material discussed provides insights into the construction and operation of 'large connections' of transoceanic botanical networks that were not bound to national identities. Rather, a common interest in plants and novel knowledge brought together diverse agents across the geopolitical spectrum, with their interaction enabled by the burgeoning commerce and, especially, local go-betweens. In the realms of the network in question, Kamel formed a dynamic element, as he did not merely passively transmit information to the European metropolis, but instead actively shaped the form and contents of the network to his own advantage. His peripheral agency was determined by motivations located both in the new and the old world: while the connection with Petiver enabled him to procure valuable equipment for his local Philippine pharmaceutical practice, it also seems that – in search of intellectual acknowledgement – Kamel used the link with London to approach Ray and convinced him to include his work in his major botanical publication. The regional network in which Kamel exchanged knowledge and objects with ten Rhijne and the Madras surgeons, and which remained restricted to the colonial periphery, only further emphasizes the activity of overseas actors. In this context, then, Manila and Madras appear as nodes of empire, acting simultaneously as both centres and peripheries. In spite of blurring this traditional dichotomy, nonetheless, Kamel's misfortunes and his descent into relative obscurity point to the advantages enjoyed by European metropolitan scholars who – although often reliant on the same long-distance networks – were not affected by their capricious nature to the same degree.

Notes

* Kamel has also been referred to as Camel, Camellus, Camelli, Cammelus or Kammel. For previous studies on Kamel, see: Gicklhorn and Gicklhorn, 1954; Cullum, 1956; Dandy, 1958; Reyes, 2009. These studies, nonetheless, give a largely biographical account and provide few references to primary sources.

² For global approaches to history of science, see: Golinski, 1998, pp. 162-185; Secord, 2004; Roberts, 2009; Elshakry 2010; Raj 2010; Sivasundaram, 2010; Trivellato, 2011. For case studies, see: Fan, 2004; Raj, 2006; Delbourgo and Dew, 2008; Schaffer et al., 2009. For contact zones, see: Pratt, 1992; Raj, 2011; Fan, 2012.

³ In his paradigmatic model for circulation of knowledge, built around 'centres of calculation', Latour (1987) focused on how cycles of accumulation and calculation contributed to the imposition of Western intellectual dominion on other cultures, failing thus to examine more local processes which fed these networks.

⁴ For the early modern history of the Society of Jesus in the Philippines, see: Murillo Velarde, 1746; de la Costa, 1961; Javellana, 2000. For the early modern Spanish presence in the Philippines, see: Phelan, 1959; Flynn and Giraldez, 1994, 1996a, 1996b; Bjork, 1998; Giraldez and Flynn, 2002; Phelan, 1959; Bjork, 1998; Mawson, 2013; Watson Andaya and Andaya, 2015.

⁵ MZA, 16858, f. 350 (1661); ARSI, Bohemiae 90, ff. 540-541 (1682).

⁶ ARSI, Bohemiae 22, vol. 5, f. 95 (1686); ARSI, Bohemiae 90, ff. 573, 599v (1687).

⁷ Considering that the Philippine mission was established in 1581 and the first Jesuit College and university in 1590, it seems unlikely that the first pharmacy was not founded until a century later. Perhaps Kamel substantially reformed it to the latest European standards. For Jesuit apothecaries, see: Harris, 1998, 2000, 2005; Anagnostou, 2005, 2007; Bravo, 2005; Martínez-Serna, 2009; de Asúa, 2014: 96-163.

⁸ Unless otherwise indicated, all translations – largely from Latin – are mine.

⁹ AGI, Filipinas 163, f. 24.

¹⁰ The unreliable and expensive supply of materials from Europe was certainly also a factor in this process, but a careful consideration of the deemed efficacy of local plants in local contexts raises a caution against an overestimation of the utility of knowledge of medicinal plants in a global context. For example, Barrera (2002) highlighted the inadequacy of European remedies and practices in the Americas, while Cooper (2007) argued that the global trade which flooded European markets with imported goods inspired a heated debate about the value of the local and the exotic (see also Pugliano, 2009).

¹¹ The personnel and traditions involved in Kamel's local practice are subjects of my on-going research. For healthcare and medicine in the Philippines, see: Bantug, 1953; Hart 1969; Mallat, 1983, 2004; Planta, 2001; Ostwald Sales, 2005; Joven, 2012.

¹² This is also apparent from the list of book *desiderata* that Kamel submitted to Petiver (see note 59).

¹³ Jesuits involved in scholarly networks were typically ordained priests with extensive university education, whereas Kamel was a lay brother trained in pharmacy without further philosophical schooling.

¹⁴ Gunther, 1928, p. 281.

¹⁵ For Petiver, see: Stearns, 1952; Dandy, 1958, pp. 175-182.

¹⁶ Findlen, 1994, pp. 241-287; Swan, 2005, 2007; Bleichmar and Mancall, 2011.

¹⁷ Although recent studies have shed more light on Petiver's British pursuits (James, 2004; Delbourgo 2012), and his correspondence in Europe (Ibáñez et al., 2006; Camarasa and Ibáñez, 2007), the Atlantic (Stearns, 1952; Murphy, 2013) and India (Winterbottom, 2010; Fleetwood, 2014), his extensive activities still remain relatively under-explored.

¹⁸ See especially: Harris, 1998, 2000, 2005; Smith and Findlen, 2002; Cook, 2007; Delbourgo and Dew, 2008; Murphy, 2013.

¹⁹ Regardless of how disparate these corporations may seem, their networks were unified by and dependent on commercial interests. Missionary orders had to negotiate their passage with other,

typically state or trading organizations whose primary concern was (commercial) profit. Even savants setting out from the absolutist France had to sometimes rely on commercial shipping and acquiesce to landing in a destination not of their choosing, since that was decided by the merchant (Dew, 2008).

²⁰ Harris, 1998; Gascoigne, 2009; Winterbottom, 2009.

²¹ In looking for such men, Petiver relied mostly on his own and his friends' existing contacts, but he also did not hesitate to go directly to the source. For instance, Petiver's correspondence with James Sutherland, the keeper of the Edinburgh Physic Garden, reveals his efforts to convince the local young medics to enrol as ship's surgeons in the colonial trade and thus simultaneously recruit them into his own 'service' (BL, Sloane 4063).

²² Petiver to George Wheeler, 18 May 1695 (BL, Sloane 3332, ff. 123-124); Petiver to William Toller, 19 November 1716 (BL, Sloane 3340, f. 275v).

²³ The surviving letters between Petiver and Madras mention numerous names of couriers, typically ship's surgeons. See especially BL, Sloane 3321.

²⁴ Kamel to Ray, 3 January 1699 (Sloane 4062, f. 292).

²⁵ See also: Cook, 1996; Spary, 2000, pp. 49-98; Meredith, 2009.

²⁶ Petiver to Kamel, 13 February 1702 (BL, Sloane 4063, ff. 140-140v).

²⁷ Kamel to Petiver, 29 October 1700 (BL, Sloane 4083A, f. 132v).

²⁸ For correspondence between Petiver, Browne and Bulkley, see: Winterbottom, 2010, pp. 70-115; Fleetwood, 2014, pp. 13-28.

²⁹ Kamel to Browne, 12 January 1699 (BL, Sloane 4062, ff. 294-296v). The original Spanish version is followed by a translation in Hans Sloane's hand.

³⁰ Ten Rhijne to Kamel, 29 August 1699 (BL, Sloane 4083A, f. 130r).

³¹ Including both Browne and Bulkley: Browne to Petiver, 30 September 1698 (BL, Sloane 4047, ff. 29-31); Bulkley to Petiver, 12 February 1707 (BL, Sloane 3321, f. 213).

³² Petiver to George Wheeler, 18 May 1695 (BL, Sloane 3332, ff. 123-124).

³³ Petiver to Browne, s.d. (BL, Sloane 3333, f. 221v)

³⁴ Spary, 2000; Raj, 2005; Schiebinger, 2005; Cook, 2007.

³⁵ Kamel to Šimon Boruhradský, 25 June 1691 (MZA, G11 571, f. 57v).

³⁶ Kamel to Petiver, 9 October 1702 (BL, Sloane 4083A, f. 135v).

³⁷ Kamel to Ray, 3 January 1699 (BL, Sloane 4062, f. 292).

³⁸ Sharing interests in natural history, they certainly knew each other from the Royal Society meetings and, moreover, both were close friends of Hans Sloane. In the period between 1696 and Ray's death in 1704, the two became closely associated, with Petiver increasingly assisting Ray in his labours. For Ray, see: Raven, 1950; Dandy, 1958; Oswald and Preston, 2011. For his collected correspondence see: Lankester, 1848; Gunther, 1928.

³⁹ Although the Englishmen referred to Kamel as 'Father', he was in fact a mere lay brother and never became a priest.

⁴⁰ Petiver to Ray, 16 July 1698 (BL, Sloane 3333, f. 148); Petiver to Browne, s.d. (BL, Sloane 3333, f. 221v).

⁴¹ Kamel to Ray, 3 January 1699 (BL, Sloane 4062, f. 292v).

⁴² Ray to Kamel, 20 May 1701 (BL, Sloane 3334, f. 68v); Ray to Sloane, 14 August 1700 (Lankester, 1848, p. 374).

⁴³ Petiver published the majority of the remaining works that Kamel sent to London in the *Philosophical Transactions*. Although these were far from the only Jesuit contributions, in the first fifty years of the journal's existence (1665-1715) Kamel on his own was responsible for more than a third of these and in his 'active period' (1699-1711) for more than 80%.

⁴⁴ Georg Eberhard Rumphius (1627-1702) presents another well-known example of such misfortunes (see Cook 2007, pp. 329-332).

⁴⁵ Kamel to Ray, 3 January 1699 (BL, Sloane 4062, f. 292v); Kamel to Petiver, 29 October 1700 (BL, Sloane 4083A, f. 132r).

⁴⁶ Kamel to Ray, 3 January 1699 (BL, Sloane 4062, f. 292v).

- ⁴⁷ Kamel to Ray, 28 October 1700 (Lankester, 1848, p. 377); Kamel to Petiver, 1 November 1701 (BL, Sloane 4083A, f. 134r).
- ⁴⁸ Ray to Kamel, 20 May 1701 (BL, Sloane 3334, f. 68v).
- ⁴⁹ Ten Rhijne to Kamel, 20 July 1698 (BL, Sloane 4083A, f. 128r). For ten Rhijne, see: Dandy, 1958, pp. 193-194; Iwao, 1961; Cook, 2007, pp. 339-377; Verwaal, 2010.
- ⁵⁰ Ten Rhijne to Kamel, 20 July 1698 (BL, Sloane 4083A, ff. 128r-129v).
- ⁵¹ Ten Rhijne to Kamel, 20 July 1698 (BL, Sloane 4083A, f. 128v). Religion could be considered as one of the points where the etiquette of scholarly correspondence was truly tested. While religious issues as potential sources of conflict were generally avoided, this example demonstrates that if used carefully, religion could be brought in and exploited to one's own advantage.
- ⁵² Ten Rhijne to Kamel, 29 August 1699 (BL, Sloane 4083A, f. 131v).
- ⁵³ Six volumes of Kamel's drawings are held in the British Library (BL, Sloane 4080; 4081; 4082; 4083A; 4083B; 4083C), one volume is held in the Natural History Museum (NHM, Bauer Unit, H7) and another one – containing largely copies – in the Maurits Sabbe Library, Katholieke Universiteit Leuven (S.J. F° HS 112 K CAME 1700*).
- ⁵⁴ Ray to Petiver, 22 December 1703 (Lankester, 1848, p. 439).
- ⁵⁵ Ray to Sloane, 16 November 1698 (Lankester, 1848, p. 347).
- ⁵⁶ Although all available sources suggest that, ironically, Kamel never saw or described camellia, they are mistaken. A drawing of the camellia appears under the label 'Tchia' in two different volumes of Kamel's works (NHM, Bauer Unit, H7, f. 153; Maurits Sabbe Library, Katholieke Universiteit Leuven, S.J. F° HS 112 K CAME 1700*, f. 234), its description showed up in Kamel's appendix to Ray's *Historia* (Kamel, 1704b, p. 73) and even a sample of the plant can be found in one of Kamel's herbaria (NHM, HS 165, f. 85).
- ⁵⁷ Ten Rhijne to Kamel, 29 August 1699 (BL, Sloane 4083A, f. 131r); Kamel to Petiver, 29 October 1700 (BL, Sloane 4083A, f. 132v).
- ⁵⁸ Ray to Kamel, 20 May 1701 (BL, Sloane 3334, f. 68v); Kamel to Petiver, 1 November 1701 (BL Sloane 4083A, f. 134v).
- ⁵⁹ BL, Sloane 3323, f. 51v.
- ⁶⁰ Kamel to Browne, 12 January 1699 (BL, Sloane 4062, f. 296v).
- ⁶¹ The same happened again with one of ten Rhijne's consignments: ten Rhijne to Kamel, 29 August 1699 (BL, Sloane 4083A, f. 130r).
- ⁶² Kamel to Ray, 3 January 1699 (BL, Sloane 4062, f. 292).
- ⁶³ Ten Rhijne to Kamel, 29 August 1699 (BL, Sloane 4083A, f. 131v).
- ⁶⁴ Kamel to Browne, 12 January 1699 (BL, Sloane 4062, f. 296). The 'Manungal tree' is probably *Quassia indica* (*manunggal* in Tagalog), whereas the 'Mananangtang tree' probably *Dysoxylum gaudichaudianum*. In all species identifications, I have followed Merrill (1903).
- ⁶⁵ Bulkley to Petiver, 11 February 1714 (BL, Sloane 3322, f. 43). The 'Balimbago' is probably the sea hibiscus (*Hibiscus tilliaceus*; *balibago* in Tagalog). 'Ipecac' is the renowned Jesuit drug prepared from the roots of *ipecacuanha* (*Carapichea ipecacuanha*) and used as an emetic and cough syrup until the early twentieth century.
- ⁶⁶ Bulkley to Petiver, 10 February 1714 (BL, Sloane 3321, f. 133-133v). The 'Panitsjakamar is probably the Malabar ebony (*Diospyros malabarica*).
- ⁶⁷ Bulkley to Petiver, 24 January 1706 (BL, Sloane 3321, f. 185).
- ⁶⁸ Bulkley to Petiver, 18 March 1705 (BL, Sloane 3321, f. 171); Bulkley to Petiver, 23 February 1706 (BL, Sloane 3321, f. 190); Bulkley to Petiver, 12 February 1707 (BL, Sloane 3321, f. 213).
- ⁶⁹ Bulkley to Petiver, 24 January 1706 (BL, Sloane 3321, f. 185); Bulkley to Petiver, 20 December 1707 (BL, Sloane 3321, f. 222); Bulkley to Petiver, 18 January 1708 (BL, Sloane 3321, f. 223).
- ⁷⁰ Petiver to Kamel, 11 February 1708 (BL, Sloane 3336, f. 45).
- ⁷¹ Kamel to Petiver, 9 October 1702 (BL, Sloane 4083A, f. 135r).
- ⁷² Petiver to Kamel, 11 February 1708 (BL, Sloane 3336, f. 45).
- ⁷³ Bulkley to Petiver, 12 February 1707 (BL, Sloane 3321, f. 213); Bulkley to Petiver, 20 December 1707 (BL, Sloane 3321, f. 222).

⁷⁴ Bulkley to Petiver, 18 January 1708 (BL, Sloane 3321, f. 223).

⁷⁵ Serrano to Bulkley, s.d. (BL, Sloane 4064, f. 157). This letter survives in Bulkley's copy dated to 9 January 1709.

⁷⁶ Bulkley to Petiver, 25 January 1709 (BL, Sloane 3321, f. 241); Petiver to Serrano 28 March 1710 (BL, Sloane 3337, f. 100).

⁷⁷ Petiver to Bulkley, 28 March 1710 (BL, Sloane 3337, ff. 80v-81).

⁷⁸ Petiver to Serrano 28 March 1710 (BL, Sloane 3337, f. 100).

⁷⁹ Serrano to Bulkley, s.d. (BL, Sloane 4064, f. 157).

⁸⁰ Petiver to Serrano, 28 March 1710 (BL, Sloane 3337, f. 100v); Petiver to Serrano, 15 January 1711 (BL, Sloane 3337, ff. 114v-115v).

⁸¹ Petiver to Serrano, 28 March 1710 (BL, Sloane 3337, f. 100v).

⁸² Bulkley to Petiver, 11 January 1712 (BL, Sloane 3321, f. 268).

Abbreviations

AGI: Archivo General de Indias, Seville

ARSI: Archivum Romanum Societatis Iesu, Rome

BL: British Library, London

MZA: Moravský zemský archiv, Brno, Czech Republic

NHM (HS): Natural History Museum, London (Hortus Siccus)

Bibliography

- Anagnostou, S. (2005) Jesuits in Spanish America: contributions to the exploration of the American materia medica, *Pharmacy in History* 41(1), 3-17.
- Anagnostou, S. (2007) The international transfer of medicinal drugs by the Society of Jesus (sixteenth to eighteenth centuries) and connections with the work of Carolus Clusius, in F. Egmond, P. Hoftijzer and P. Visser (eds.), *Carolus Clusius: towards a cultural history of a Renaissance naturalist* (Amsterdam: Royal Netherlands Academy of Arts and Sciences), pp. 293-312.
- Arnold, D. (1996) *Warm climates and Western medicine: the emergence of tropical medicine, 1500-1900* (Amsterdam; Atlanta: Rodopi).
- de Asúa, M. (2014) *Science in the vanished Arcadia: Knowledge of nature in the Jesuit missions of Paraguay and Río de la Plata* (Leiden; Boston: Brill).
- Bacon, F. (1605) *Of the proficience and advancement of learning*, [Ed. Montagu, B., 1840] (London: William Pickering).
- Bacon, F. (1688) *Gesta grayorum* [Ed. Greg, W. W., 1914] (London: Oxford University Press).
- Bantug, J. P. (1953) *A short history of medicine in the Philippines during the Spanish regime, 1565-1898* (Manila: Colegio Médico-Farmacéutico de Filipinas).
- Barrera, A. (2002) Local herbs, global medicines: commerce, knowledge and commodities in Spanish America' in P.H. Smith and P. Findlen (eds.) *Merchants and marvels: commerce, science, and art in early modern Europe* (London: Routledge), pp.163-181.
- Bjork, K. (1998) The link that kept the Philippines Spanish: Mexican merchant interests and the Manila trade, 1571-1815, *Journal of World History*, 9(1), 25-50.
- Bleichmar, D. and Mancall, P. C. (eds.) (2011) *Collecting across cultures: material exchanges in the early modern Atlantic world* (Philadelphia: University of Pennsylvania Press).
- Bourdieu, P. (1973) Cultural reproduction and social reproduction, in R. Brown (ed.) *Knowledge, education and cultural change: papers in the sociology of education* (London: Tavistock), pp.71-112.
- Bowrey, T. (1905) *A geographical account of countries round the Bay of Bengal 1669 to 1679* [ed. Temple, R. C.] (Cambridge: Hakluyt Society).
- Camarasa, J. M. and Ibáñez N. (2007) Joan Salvador and James Petiver: a scientific correspondence (1706-1714) in time of war, *Archives of natural history* 34(1), 140-173.
- Cook, E. H. (1996) *Epistolary bodies: gender and genre in the eighteenth century Republic of Letters* (Stanford: Stanford University Press).
- Cook, H. J. (1996) Physicians and natural history, in N. Jardine, J. A. Secord and E. C. Spary (eds.), *Cultures of natural history* (Cambridge: Cambridge University Press), pp.91-105.
- Cook, H. J. (2007) *Matters of exchange: commerce, medicine, and science in the Dutch Golden Age* (New Haven; London: Yale University Press).
- Cook, W. J. (2012) The correspondence of Thomas Dale (1700-1750): botany in the transatlantic Republic of Letters, *Studies in History and Philosophy of Biological and Biomedical Sciences* 43, 232-243.
- Cooper, A. (2007) *Inventing the indigenous: local knowledge and natural history in early modern Europe* (Cambridge; New York: Cambridge University Press).
- Cullum, L. A. (1956) Georg Joseph Kamel: Philippine botanist, physician, pharmacist, *Philippine Studies* 4(2), 319-339.
- Dandy, J. E. (1958) *The Sloane herbarium: an annotated list of the horti sicci composing it* (London: Trustees of the British Museum).
- Daston, L. and Park, K. (1998) *Wonders and the order of nature, 1150-1750* (New York City: Zone Books).
- de Boye, E. (1702) *Vita et obitus venerabilis Patris Henrici Wenceslai Richter* (Prague).
- de la Costa, H. (1961) *The Jesuits in the Philippines, 1581-1768* (Cambridge: Harvard University Press).
- Delbourgo, J. (2012). Collecting Hans Sloane, in A. Walker, A. MacGregor and M. Hunter (eds.) *From books to bezoars* (London: The British Library), pp.9-23.

- Delbourgo, J. and Dew, N. (eds.) (2008) *Science and empire in the Atlantic world* (New York City; London: Routledge).
- Dew, N. (2008) 'Vers la ligne': circulating measurements around the French Atlantic, in J. Delbourgo, and N. Dew (eds.) *Science and empire in the Atlantic world* (New York City; London: Routledge), pp.53-72.
- Elshakry, M. (2010) When science became Western: historiographical reflections, *Isis* 101, 98-109.
- Fan, F. (2004) *British naturalists in Qing China: science, empire, and cultural encounter* (Cambridge: Harvard University Press).
- Fan, F. (2012) The global turn in the history of science, *East Asian Science, Technology and Society: An International Journal* 6, 249-258.
- Findlen, P. (1994) *Possessing nature: museums, collecting, and scientific culture in early modern Italy* (Berkeley; Los Angeles: University of California Press, 1994).
- Fleetwood, L. C. (2014) How to dissect an elephant: surgeons, clergymen, local informants and the production of knowledge at Fort St George, 1690-1730. Unpublished MA dissertation, University of British Columbia.
- Flynn, D. O. and Giraldez, A. (1994) China and the Manila Galleons, in A. J. H. Latham and H. Kawakatsu, (eds.), *Japanese industrialization and the Asian economy* (London: Routledge), pp. 71-90.
- Flynn, D. O. and Giraldez, A. (1996a) Silk for silver: Manila-Macao trade in the 17th century, *Philippine Studies*, 44(1), 52-68.
- Flynn, D. O. and Giraldez, A. (1996b) China and the Spanish Empire, *Journal of Iberian and Latin American Economic History*, 14(2), 309-338.
- Gascoigne, J. (2009) The Royal Society, natural history and the peoples of the 'New World(s)', *British Journal for the History of Science* 42(4), 539-562.
- Gicklhorn, J. and Gicklhorn, R. (1954) *Georg Joseph Kamel, S. J.: apotheker, botaniker, arzt und naturforscher der Philippineninseln* (Eutin: Holstein Internationales Gesellschaft für Geschichte der Pharmazie).
- Giraldez, A. and Flynn, D. O. (2002) Cycles of silver: Global economic unity through the mid-eighteenth century, *Journal of World History*, 13(2), 391-427.
- Goldgar, A. (1995) *Impolite learning: conduct and community in the Republic of Letters, 1680-1750* (New Haven; London: Yale University Press).
- Golinski, J. (1998) *Making natural knowledge: constructivism and the history of science* (Cambridge: Cambridge University Press).
- Gunther, R. W. T. (ed.) (1928) *Further correspondence of John Ray* (London: Ray Society).
- Harris, S. J. (1998) Long-distance corporations, big sciences, and the geography of knowledge, *Configurations* 6(2), 269-304.
- Harris, S. J. (2000) Mapping Jesuit science: the role of travel in the geography of knowledge, in J. W. O'Malley, G. A. Bailey, S. J. Harris and T. F. Kennedy (eds.) *The Jesuits: cultures, sciences, and the arts 1540-1773* (Toronto), pp.212-240.
- Harris, S. J. (2005) Jesuit scientific activity in the overseas missions, 1540-1773', *Isis* 96, 71-78.
- Hart, D. V. (1969) *Bisayan Filipino and Malayan humoral pathologies: folk medicine and ethnohistory in Southeast Asia* (Ithaca, NY; Southeast Asia Program, Cornell University).
- Ibáñez, N., Montserrat, J. M., Soriano, I., and Camarasa J. M. (2006) Plant material exchanged between James Petiver (ca.1663-1718) and Joan Salvador i Riera (1683-1725). I. The Balearic plants conserved in the BC-Salvador and BM-Sloane herbaria, *Notes and Records of the Royal Society* 60, 241-248.
- Iwao, S. (1961) A Dutch Doctor in Old Japan, *Japan Quarterly* 8(2), 170-178.
- James, K. A. (2004) 'Humbly dedicated': Petiver and the audience for natural history in early eighteenth century Britain, *Archives in Natural History* 31(2), 318-329.
- Javellana, R. B. (2000) The Jesuits and the indigenous peoples of the Philippines, in J. W. O'Malley, G. A. Bailey, S. J. Harris and T. F. Kennedy (eds.), *The Jesuits: cultures, sciences, and the arts 1540-1773* (Toronto), pp.418-438.

- Joven, A. E. (2012) Colonial adaptations in tropical Asia: Spanish medicine in the Philippines in the seventeenth and eighteenth centuries, *International Christian University Publications, 3-A, Asian Cultural Studies*, 38, 171-186.
- Kamel, G. J. (1699) A description and figure of the true amomum, or tugus, *Philosophical Transactions of the Royal Society* 21, 2–4.
- Kamel, G. J. (1704a) Tractatus de plantis Philippensibus scandentibus, *Philosophical Transactions of the Royal Society* 24, 1707–1722, 1763–1773, 1809, 1816–1842.
- Kamel, G. J. (1704b) Historia stirpium insula Luzonis et reliquarum Philippinarum’, in J. Ray, *Historia Plantarum*, vol. 3 (London), 1-96.
- Laarhoven, R. and Wittermans, E. P. (1985) From blockade to trade: early Dutch relations with Manila, 1600-1750, *Philippine Studies* 33(4), 485-504.
- Lankester, E. (ed.) (1848) *The correspondence of John Ray* (London: Ray Society).
- Latour, B. (1987) Centres of calculation, in *Science in action: how to follow scientists and engineers through society* (Cambridge: Harvard University Press), pp.215-257.
- Leong, E. and Rankin, A. (eds.) (2011) *Secrets and knowledge in medicine and science, 1500-1800* (Farnham; Burlington: Ashgate).
- Linnaeus, C. (1737) *Hortus Cliffortianus* (Amsterdam).
- Linnaeus, C. (1753) *Species plantarum*, vols. 1 and 2 (Stockholm: Laurentius Salvius).
- Mallat, J. (1983) *The Philippines: History, geography, customs, agriculture, industry, and commerce of the Spanish colonies in Oceania* [Ed. Santillan-Castrenc, P. and Santillan-Castrenc, L.] (Manila: National Historical Institute).
- Mallat, J. (2004) Educational institutions and conditions, in E. H. Blair, J. A. Robertson and E. G. Bourne (eds.), *The Philippine Islands, 1493–1898* (Project Gutenberg), pp. 263-279.
- Mawson, S. (2013) Unruly plebeians and the forzado system: Convict transportation between New Spain and the Philippines during the seventeenth century, *Revista de Indias*, 73(259), 693-730.
- Meredith, M. (2009) Friendship and knowledge: correspondence and communication in northern trans-Atlantic natural history, 1780–1815, in S. Schaffer, L. Roberts, K. Raj and J. Delbourgo (eds.) *The brokered world: go-betweens and global intelligence, 1770-1820* (Sagamore Beach: Science History Publications), pp.151-191.
- Merrill, E. D. (1903) *A dictionary of the native plant names of the Philippine Islands* (Manila: Bureau of Public Printing).
- Murillo Velarde, P. (1749) *Historia de la Provincia de Philipinas de la Compañía de Jesus* (Manila).
- Murphy, K. S. (2013) Collecting slave traders: James Petiver, natural history, and the British slave trade, *The William and Mary Quarterly* 70(4), 637–670.
- Ostwald Sales, C. (2005) Las actividades médicas en las Filipinas durante la primera mitad del siglo XVII, *Perspectivas latinoamericanas*, 2, 167-186.
- Oswald, P. H. and Preston, C. D. (eds.) (2011) *John Ray’s Cambridge catalogue (1660)* (London: Ray Society).
- Petiver, J. (1699) *Musei Peteiveriani, centuria quarta et quinta* (London).
- Petiver, J. (1702) *Gazophylacium naturae et artis, decas prima* (London).
- Phelan, J. L. (1959) *The Hispanization of the Philippines: Spanish aims and Filipino responses, 1565-1700*. (Madison: University of Wisconsin Press).
- Planta, M. G. (2001) Traditional medicine and pharmacopoeia in the Philippines, 16th and 17th centuries, in A. K. Chan, G. K. Clancey and H.-C. Loy (eds.), *Historical Perspectives on East Asian Science, Technology, and Medicine* (Singapore; New Jersey; London; Hong Kong: Singapore University Press), pp. 157-171.
- Pratt, M. L. (1992) *Imperial eyes: studies in travel writing and transculturation* (London: Routledge).
- Pugliano, V. (2009) Non-colonial botany or, the late rise of local knowledge?, *Studies in History and Philosophy of Biological and Biomedical Sciences* 40, 321-328.
- Pugliano, V. (2012) Specimen lists: artisanal writing or natural history paperwork?, *Isis* 103, 716-726.
- Quiason, S. D. (1963) The English ‘country trade’ with Manila prior to 1708, *Philippine Economic Journal* 2, 64-83.

- Raj, K. (2006) *Relocating modern science* (Delhi: Permanent Black).
- Raj, K. (2005) Surgeons, fakirs, merchants, and craftspeople: Making l'Empereur's Jardin in early modern South Asia, in L. Schiebinger and C. Swan (eds.) *Colonial botany: science, commerce, and politics in the early modern world* (Philadelphia: University of Pennsylvania Press), pp.252-269.
- Raj, K. (2011) The historical anatomy of a contact zone: Calcutta in the eighteenth century, *Indian Economic Social History Review* 48(1), 55-82.
- Raj, K. (ed., intro.) (2010) Circulation and locality in early modern science, special issue of *British Journal for the History of Science* 43(4).
- Raven, C. E. (1950) *John Ray, naturalist: his life and works* (Cambridge: University Press).
- Reyes, R. A. G. (2009) Botany and zoology in the late seventeenth-century Philippines: the work of Georg Josef Camel SJ (1661-1706), *Archives of natural history* 36(2), 262–276.
- Roberts, L. (2009) Situating science in global history: local exchanges and networks of circulation, *Itinerario* 33(1), 9-30
- Schaffer, S., Roberts, L., Raj, K. and Delbourgo, J. (eds.) (2009) *The brokered world: go-betweens and global intelligence, 1770-1820* (Sagamore Beach: Science History Publications).
- Schiebinger, L. (2005) Prospecting for drugs: European naturalists in the West Indies, in L. Schiebinger and C. Swan (eds.) *Colonial botany: science, commerce, and politics in the early modern world* (Philadelphia: University of Pennsylvania Press), pp.119-133.
- Schiebinger, L. and Swan, C. (eds.) (2005) *Colonial botany: science, commerce, and politics in the early modern world* (Philadelphia: University of Pennsylvania Press).
- Secord, J. A. (2004) Knowledge in transit, *Isis* 95(4), 654-672.
- Siraisi, N. G. (2007) *History, medicine, and the traditions of Renaissance learning* (University of Michigan Press).
- Sivasundaram, S. (ed., intro.) (2010) *Focus: global histories of science*, *Isis* 101(2).
- Smith, P. H. and Findlen P. (eds.) (2002), *Merchants and marvels: commerce, science, and art in early modern Europe* (London: Routledge).
- Spary, E. C. (2000) *Utopia's garden: French natural history from Old Regime to Revolution* (Chicago: University of Chicago Press).
- Stearns, R. P. (1952) James Petiver: promoter of natural science, c.1663–1718, *Proceedings of the American Antiquarian Society* 62, 243-365.
- Swan, C. (2005) Collecting naturalia in the shadow of early modern Dutch trade, in L. Schiebinger and C. Swan (eds.) *Colonial botany: science, commerce, and politics in the early modern world* (Philadelphia: University of Pennsylvania Press), pp.223-236.
- Swan, C. (2007) Making sense of medical collections in early modern Holland: the uses of wonder, in P.H. Smith and B. Schmidt (eds.) *Making knowledge in early modern Europe: practices, objects, and texts, 1400-1800* (Chicago; London: University of Chicago Press), 199-213.
- Trivellato, F. (2011) Is there a future for Italian microhistory in the age of global history?, *California Italian Studies* 2(1).
- Verwaal, R. (2010) Hippocrates meets the Yellow Emperor: on the reception of Chinese and Japanese medicine in early modern Europe. Unpublished MA thesis, Utrecht University.
- Watson Andaya, B. and Andaya, L. Y. (2015) *A history of early modern Southeast Asia, 1400-1830* (Cambridge; New York: Cambridge University Press).
- Winius, G. (1994) A tale of two Coromandel towns: Madraspatam (Fort St. George) and São Thomé de Meliapur, *Itinerario* 18(1), 51-64.
- Winterbottom, A. (2009) Producing and using the historical relation of Ceylon: Robert Knox, the East India Company and the Royal Society, *British Journal for the History of Science* 42(4), 515-538.
- Winterbottom, A. (2010) Company culture: information, scholarship, and the East India Company settlements 1660-1720s. Unpublished PhD dissertation, University of London).
- Yale, E. (2009) With slips and scraps: How early modern naturalists invented the archive, *Book History* 12(1), 1-36.
- Yale, E. (2011) Marginalia, commonplaces, and correspondence: scribal exchange in early modern science, *Studies in History and Philosophy of Biological and Biomedical Sciences* 42, 193-202.