Empires of Knowledge: Scientific Networks in the Early Modern World

Francis Bacon's unfinished utopian novel *The New Atlantis* is often invoked in scholarship about early modern scientific projects. With its 'Merchants of Light' who gather information and bring it back to the House of Solomon, *The New Atlantis* seems to capture perfectly the aspirations of a group of European scholars who saw themselves as reassessing the bases of knowledge by revaluing personal experience.

Paula Findlen's edited volume *Empires of Knowledge: Scientific Networks in the Early Modern World* —which contains an introduction, 13 stand-alone essays, two epilogues and an afterward—opens with this familiar Baconian set-piece, but shows just how much of Bacon's vision has been left out of scholarly analysis. The volume does so by taking Bacon's imagery seriously: The Bensalemite 'Merchants of Light' spoke Spanish, but only as one among many languages, and only because it was a convenient lingua franca. They were not from Spain, they were emphatically from outside of the borders of Europe. Central to the argument of *Empires of Knowledge* is the acknowledgement of the unrealised and unrealisable aspects of Bacon's vision. No merchant can in fact be a 'Merchant of Light'. Rather, people, ideas, and goods travel through space imperfectly and non-instantaneously, encountering friction at every step of the way. As Findlen puts it, 'long-distance information was a scarce commodity, dangerously acquired, that passed through many hands' (p. 3).

These 'many hands' include Jewish astronomers who travelled between Istanbul and Padua (Morrison), parish priests in the Veneto countryside who collected fossils to assess the nature of the Noahide flood (Dal Prete), Chinese philologists employed by the Qing state to survey their newly acquired territory (Statman), Bengali literati sent to London as emissaries of the Mughal state (Raj), African slaves who laboured under successive regimes of European states in the West Indies (Schiebinger), and Jesuits seemingly everywhere (Findlen).(1) Each is engaged—whether they are aware of it or not—in the construction of a scientific network with connections as well as implications well beyond their local situation.

The analysis of networks and of information is at the heart of each of the essays in *Empires of Knowledge*, which makes a pointed case for further historical investigations into these phenomena as well as for further

historicizing of theoretical concepts. *Empires of Knowledge* shows the full value of bringing together the two mature fields of Republic of Letters Studies and Science & Empire Studies, and does so in an elegant and forceful manner. The project has predecessors, which are duly noted in Findlen's comprehensive introduction, and where *Empires of Knowledge* makes contributions as a collective endeavor, it is often by uniting fields of scholarship that are too commonly kept at arm's-length. Contributors draw on a diverse body of primary sources to sketch the contours of what Lorraine Daston has elsewhere called an 'empire of observation' in order to show how a global vision is not only a political nicety, but a historical necessity when narrating the epistemic changes occurring between 1500 and 1800.(2)

When it comes to networks, Bruno Latour's actor-network theory haunts the volume. Networks, in these essays, are both physical and conceptual. Networks are used to describe the routes that mail takes (Lipkowitz), but also the forms of attribution that individuals who receive mail use—or don't use—when talking about their correspondence (Pal). Networks describe the positioning of Jesuits around the globe (Findlen), but also the way in which Jesuits graphically depicted their global distribution (Aranda). Benjamin Breen's essay about João Curvo Semedo focuses on new types of pharmaceuticals occasioned by the expanding Portuguese tropical empire, and follows both Semedo's citations and his ingredients. At times citations and ingredients overlap, but more often than not there is a discord between the physical networks that Semedo participated in and the scholarly networks he acknowledges. Overall, the image of scientific networks that arises from the volume is one of partial connectivity and many disjunctures. The physical and conceptual aspects of networks interact with each other in complex manners. Neither fully determines the other, but the historical imaginings of networks play an important role in how material objects as well as ideas travel. As a whole, *Empires of Knowledge* is a timely reminder that networks are instantiated in specific historical contexts, with different properties in each moment, and the volume shows the role that historians can play in theoretical debates over tools used across the humanities and social sciences.

Among the volume's contributors, Matthew Sargent and Kapil Raj take positions most openly critical of Latour. Sargent engages with Latour's early work in *Science in Action*, and argues that 'centers of calculation need not be geographically, socially, or politically central'. Focusing on joint-stock companies in the early modern period Sargent argues that 'Europe was often on the periphery of these organizations' commercial activities' (p. 299). Raj attacks the use of network-imagery more forcefully, restating a number of critiques of Latour's early work that he made in *Relocating Modern Science*. Raj argues that scholars should replace their analysis of networks with an analysis of 'spaces of circulation', which, for him suggest 'a fabric of topographical unevenness, asymmetries, and also the possibility of tapping into a continuum of relations, rather than building individual linkages' (p. 274). Knowledge, in this account, circulates, but is remade and reconfigured across interactions. And perhaps more could have been said here. The time-period covered in *Empires of Knowledge* was one in which there were heated discussions about circulation. Intense debates over how blood and money circulated were carried out across Europe, increasingly in books and newspapers that were also seen to be circulating.(3) In particular, it is through the language of circulation that value came to be associated with motion, although the exact terms would be contested among classical economists and their critics. If circulation is to be used as an analytical tool to assess the early modern period, the role of early modern discussions of circulation—of blood, money, books, and otherwise—should be taken into account. If ideas circulated in new manners in this period, the idea of circulation shaped that process.(4)

While the word 'knowledge' appears in the title of the volume, and while some contributors make use of the concept, *Empires of Knowledge* joins a number of recent studies that place information management, information orders, and information infrastructures centrestage.(5) Information is both an actors' category and a useful analytic for the contributors to *Empires of Knowledge*, allowing them to think on a smaller and more particular scale than that of knowledge. Information is less embodied than knowledge, it is portable across contexts; indeed, it is the building-block of something like knowledge. It is information—in addition to people and goods—that moves through networks. Londa Schiebinger's essay about the medical uses of the plant known as '*bois fer*' in the 18th-century West Indies expertly traces the processes by which embodied know-how was turned into textualised information, and then back into embodied know-how once

again; transforming every step of the way. Taken as a whole, *Empires of Knowledge* raises a set of questions about portability and scale, questions that are raised by the epistemic entailments of empire, but are not limited to empires. What is it—to borrow a phrase—to see like an empire? Is there a particularly imperial way of knowing?(6) And, perhaps more fundamentally: How is it that knowledge is transformed into information and made non-local?

The two epilogues and the afterward to the volume—by Carla Nappi, Rachel Midura, and Harold J. Cook—place the reflections found in the main chapters into a broader context, while pushing the limits of the network framework. Nappi draws inspiration from process philosophy to ask what it would mean to approach moments of encounter that are productive of objects. She calls for a history of objects *as* movement, as always in flux. This history of ephemera would approach many of the same historical moments as a history of networks, but would use archival traces from the inside out, reconstructing objects from networks, not the other way around. Midura, too, wants to treat networks as productive—rather than static—entities and she calls for investigations that attribute agency to the structures of networks themselves. Cook places the question of movement in the larger history and philosophy of science. He argues that the study of global information networks offers a return to some of the fundamental questions that fixated scholars in the 20th century—such as the nature of knowledge production and the sociology of scientific communities—while presenting a number of new research questions that extend beyond them.

The volume sets the stage for a diverse set of successor projects. In particular, a number of alternative information infrastructures centred outside of the geographic bounds of Europe and European colonies appear at the peripheries of the networks described in *Empires of Knowledge,* and bringing those peripheral networks to the centre would offer a valuable new perspective on the nature of the European Republic of Letters. These alternative information infrastructures appear most visible in Robert Morrison and Alexander Statman's essays.

Morrison, whose essay previously appeared in *Isis*, follows the career of Moses Galeano, a Jewish astronomer who wrote in Arabic under the name M?sa J?l?n?s, and who moved between the court of the Ottoman Sultan Bayezit II and the Veneto, possibly the University of Padua. Morrison expertly uses Galeano's career to trace the presence of networks of Jewish astronomers operating between Islamic and Christian contexts, particularly important in the history of science because of Copernicus's use of models and tools developed in Arabic texts, which is only now becoming fully acknowledged by historians of science.(7)

Statman, in his contribution, traces an intellectual program that linked the French savants Antoine Court de Gébelin and Jean-Sylvan Bailly in the upper echelons of Parisian society; the ex-Jesuit Joseph-Marie Amiot who was left without patronage in Beijing after the suppression of the Jesuit order by Rome; and a group of Chinese scholars including Wang Chang and Ruan Yuan who were brought together by the Manchu prince Hongwu. All of these individuals were invested in the philological reconstruction of the Chinese past through the decoding of stele spread throughout the Qing Empire, and they were at least partially aware of each other's efforts. Most significantly for Statman, this group of French scholars appropriated Chinese history and scholarship in order to argue for the presence of a *prisca scientia* that had once spread throughout the world, and which was only coming into the view of Europeans in the 18th century. The notion of the historical progress of knowledge that Condorcet and Voltaire would develop was neither inevitable nor obvious. To some of their colleagues in late-18th-century Paris, the history of science appeared to be much more global, with European knowledge returning to an earlier, more perfect, state.(8)

These two essays serve as important reminders that not all scientific networks were controlled or even facilitated by people born in Europe, and that metropolitan centres in Europe or European colonies were not the only nodes in information networks in the early modern period. In the period covered in *Empires of Knowledge*, Persian and Arabic medical and astronomical books became valued commodities in Ming China; Jesuit missionaries recognised something of an alternative republic of letters in South India and styled themselves Tamil poets and grammarians; the state of the fifth Dalai Lama sponsored a series of

medical projects that employed classical scholars, experts in local botany, and painters; and Mughal monarchs became obsessed with cartographic representations of the globe.(9) The themes and methods that *Empires of Knowledge* so elegantly brings to the fore could productively be applied to co-eval information gathering and management projects that reached their conclusions, and not simply their instigations, in the hearts of the Qing, Mughal, or Ottoman empires. Not all scientific networks ended—or even connected—with centres of learning in Europe.

Findlen notes in the introduction that 'the asymmetry of sources and linguistic skills continues to make it easier for many historians to work with British, European, and American documents, though a new generation of scholars is rising to the challenge of working across cultural and linguistic domains, inspired by the work of senior historians well represented in this volume who have led the way' (p. 13). This new generation of scholars would do well to take up the tools and questions developed in *Empires of Knowledge*, and push the boundaries of the geography of knowledge further.

The project that led to *Empires of Knowledge* also produced *Palladio,* a web-based data-visualization program that was developed at Stanford with the goal of being accessible for humanists with little to no experience in programming languages.(10) The platform is easy to use (I can attest that it takes no more than 15 minutes to master), and should help scholars working on diverse projects to map relationships across time and space elegantly and easily.

Notes

1. In this, the project follows closely on the heels of *The Brokered World: Go-Betweens and Global Intelligence, 1770–1820*, ed. Simon Schaffer, Lissa Roberts, Kapil Raj, and James Delbourgo (Sagamore Beach, MA, 2009).Back to (1)
2. Lorraine Daston, 'The empire of observation, 1600–1800', in *Histories of Scientific Observation*, ed. Lorraine Daston and Elizabeth Lunbeck (Chicago, IL, 2011), pp. 81–113.Back to (2)
3. Scholars in Europe were also very interested in whether Chinese physicians possessed a notion of the circulation of blood. See Harold John Cook, *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age* (New Haven, CT, 2007), ch. 9.Back to (3)
4. For a slightly later period, see Hansun Hsiung, 'Knowledge made cheap: global learners and the logistics of reading', *Publications of the Modern Language Association of America: PMLA*, 134, 1 (2019), 137–43.Back to (4)
5. For overviews of this argument more generally, see Paul N. Edwards, Lisa Gitelman, Gabrielle Hecht, Adrian Johns, Brian Larkin, and Neil Safier, 'AHR conversation: historical perspectives on the circulation of information', *The American Historical Review*, 116, 5 (2011), 1392–1435; and Ann Blair and Devin Fitzgerald, 'A revolution in information?', *The Oxford Handbook of Early Modern European History, 1350–1750* (2015), 244–65.Back to (5)
6. For recent reflections on this question, see Deborah R. Coen, *Climate in Motion: Science, Empire, and the Problem of Scale* (Chicago, IL, 2018).Back to (6)
7. Morrison's essay provides an important new perspective on the evidence amassed in George Saliba, *Islamic Science and the Making of the European Renaissance*, (Cambridge, MA, 2007), ch. 6. Also see *Before Copernicus: The Cultures and Contexts of Scientific Learning in the Fifteenth Century*, ed. Rivka Feldhay and F. Jamil Ragep (Montreal, 2017).Back to (7)
8. For similar notions developed by British colonial administrators in conversation with Indian pandits and munshis in Calcutta at the same time, see Simon Schaffer, 'The Asiatic enlightenments of British astronomy', in *The Brokered World: Go-Betweens and Global Intelligence, 1770-1820*, ed. by Simon Schaffer, Lissa Roberts, Kapil Raj, and James Delbourgo (Sagamore Beach, MA, 2009), pp. 49–104. Back to (8)
9. For these examples, see respectively: Dror Weil, 'Islamicated China: China's participation in the Islamicate book culture during the seventeenth and eighteenth centuries', *Intellectual History of the Islamicate World*, 4 (2016), 36–60; Sascha Ebeling and Margherita Trento, 'From Jesuit missionary to Tamil Pulavar: Costanzo Gioseffo Beschi (1680–1747), the "Great Heroic Sage"', in *L'Inde et l'Italie. Rencontres Intellectuelles, Politiques et Artistiques*

, ed. by Tiziana Leucci and Marie Fourcade, Puru??rtha (Paris, 2018), pp. xxxv, 53–90; Janet Gyatso, *Being Human in a Buddhist World: An Intellectual History of Medicine in Early Modern Tibet* (New York, NY, 2015); Sumathi Ramaswamy, 'Conceit of the globe in Mughal visual practice', *Comparative Studies in Society and History*, 49, 4 (2007), 751–82.Back to (9)

10. <http://hdlab.stanford.edu/palladio/> [2] [accessed 5 August 2019].Back to (10)

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