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Introduction

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INDIVIDUAL ITINERARIES AND THE
SPATIAL DYNAMICS OF KNOWLEDGE
SCIENCE, TECHNOLOGY AND MEDICINE
IN CHINA, 17TH-20TH CENTURIES

EDITED BY

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INTRODUCTION

Catherine JAMI

During the second half of the twentieth century, when the history of Chinese science was established as a field of academic research, two motivations largely drove historical investigation. On the one hand, there was an effort to prove China's very presence on the scene of history of science by establishing an inventory of its "contributions," that is to say, its priorities in discovery and invention. On the other hand, the increasing length of this inventory prompted scholars to address the "Needham problem," which Joseph Needham (1900-1995), the founder of the field, stated as follows:

Why did modern science, the mathematization of hypotheses about Nature, with all its implications for advanced technology, take its meteoric rise only in the West at the time of Galileo? . . .

Why was it that between the second century B.C. and the sixteenth century A.D. East Asian culture was much more efficient than the European West in applying human knowledge of Nature to useful purposes?¹

This agenda was evidently based on the assumption that Europe provided the yardstick against which China was to be assessed. It implied a focus on the eighteen hundred years of China's "efficiency," and there was indeed a lot to uncover from such a long time-span. By contrast, the last three centuries of imperial China were much less studied, and when they were studied, it was often in search of an answer to Needham's first question: one was typically looking for something missing, something that Europe had then possessed that China had not, in order to explain "why the scientific revolution did not take place in China."²

¹ Joseph Needham, *The Grand Titration: Science and Society in East and West* (London: George Allen & Unwin Ltd, 1969), p. 16.

² This phrase is borrowed from one of the earliest critiques of this approach: Nathan Sivin, "Why the Scientific Revolution Did Not Take Place in China—or Didn't It?" *Chinese Science* 5 (1982), pp. 45-66.

As scholarship piled up evidence of the existence of pre-modern “Chinese science,”³ this “why not” question was gradually replaced by more complex ones. Specialists increasingly doubted the fruitfulness of a comparative approach that consisted in asking whether China had a particular notion or technique found in European history. They now sought to analyze the very diverse scientific, technical and medical knowledge of China on its own terms.⁴ Meanwhile, the last centuries of the imperial period were reassessed. They were no longer characterized as a time of decline and lagging behind, but rather as a period crucial for understanding not only how “traditional knowledge” gave way to “modernity” and to “universal science,” but also, more relevantly, how these three categories had been constructed.⁵ Moreover, as a way to shift away from priority issues, and from narratives of “great men,” the study of the production of knowledge increasingly gave way to the study of its circulation.

Thus, by choosing to address the issue of “knowledge circulation” rather than that of “invention and discovery,” the project of which the present book is an outcome simply follows recent trends of historiography.⁶ However, it was still inspired by the Needham problem in one respect. Needham was convinced that his double question could find an answer “only in the social and economic structures of Eastern and Western cultures.”⁷ In particular, he believed that “Asian ‘bureaucratic feudalism’ at first favored the growth of natural knowledge and its application to technology for human benefit, while later on it inhibited the rise of modern capitalism and of modern science.”⁸ These issues have been hotly debated, especially in China.⁹

³ The 25 volumes of Joseph Needham et al., *Science and Civilisation in China* (Cambridge: Cambridge University Press, 1954–) published to date represent only the tip of the iceberg of this scholarship, most of which is written in Chinese.

⁴ This phrase, first used in Michael Lackner, Iwo Amelung, and Joachim Kurtz, eds., *New Terms for New Ideas: Western Knowledge and Lexical Change in Late Imperial China* (Leiden: Brill, 2001), p. 233, has been taken up in the title of Benjamin A. Elman, *On Their Own Terms: Science in China, 1550-1900* (Cambridge, Mass.: Harvard University Press, 2005).

⁵ On this complex transition, see e.g., Elman, *On their Own Terms*; Elman, *A Cultural History of Modern Science in China* (Cambridge, Mass.: Harvard University Press, 2006).

⁶ The project was entitled “Individual itineraries and the circulation of scientific and technical knowledge in modern China (16th-20th century)” (ANR grant ANR-09-SSOC-004, 2009-2012); another set of contributions it produced have been published in Catherine Jami, ed., “Mobilité humaine et circulation des savoirs techniques (XVII^e-XIX^e siècles),” *Extrême-Orient, Extrême-Occident* 36 (2014).

⁷ Needham, *The Grand Titration*, p. 16.

⁸ Needham, *The Grand Titration*, p. 197.

⁹ For a survey of these debates in the twentieth century, see “Jinian Li Yuese danchen 100 zhounian 紀念李約瑟誕辰 100 週年,” special issue of *Ziran kexueshi yanjiu* 自然科學史研究 19, 4 (2000).

As Marxist historiography lost its influence, however, such general questions concerning the role of the structure of societies gradually ceased to be discussed.¹⁰ Still, the question of the role played by the Chinese imperial civil service in the history of science and technology remains relevant, especially if one concentrates on the last millennium of imperial China. It is now widely accepted that it was under the Song dynasty (960-1279) that the civil service acquired prime importance in the imperial state; it is no coincidence that some historians regard that dynasty as marking the beginning of China's "modern period."¹¹ To what degree and in what ways did the elite's geographical mobility as shaped by the civil service system influence the circulation of scientific and technical knowledge? This question was the starting point of our project.

In recent years, a field of "mobility studies" has emerged. Research in this field tends to focus on the contemporary world, and to concern the mass mobility of large groups of people—such as migrant workers or urban commuters.¹² Historians of science, for their part, have for some time considered the ways in which knowledge (rather than people) is affected by its location and changes of location, sometimes on a global scale.¹³ When considering the sources on which historians of late imperial China work in the light of the question of elite mobility raised above, it became apparent to the members of our project that in many cases these sources enabled us to follow one or a limited number of elite individuals over years, sometimes decades, and to consider their role as knowledge carriers in the light of their careers. This brought out individual itineraries as a thread that could fruitfully be followed, in order to take human geographical mobility into account when writing the history of science, technology and medicine in China.

¹⁰ Andrew Cunningham and Perry Williams, "De-centring the 'Big Picture': *The Origins of Modern Science* and the Modern Origins of Science," *British Journal for the History of Science* 26-4 (1993), pp. 407-432. It should be noted, however, that the Needham problem has also inspired economic historians; see, e.g., Kenneth Pomeranz, *The Great Divergence: Europe, China, and the Making of the Modern World Economy* (Princeton: Princeton University Press, 2000).

¹¹ Jacques Gernet, *Le Monde chinois* (Paris: Armand Colin, 1972), pp. 263-306.

¹² Among other publications, we may mention the journal entitled *Transfers: Interdisciplinary Journal on Mobility Studies*, which has been published since 2011; the editorial of the first issue gives an idea of the very broad coverage envisaged: Gijs Mom, Georgine Clarsen, Nanny Kim, Cotten Seiler, Kurt Möser, Dorit Müller, Charissa N. Terranova, and Rudi Volti, "Hop on the Bus, Gus," *Transfers* 1, 1 (2011), pp. 1-13.

¹³ See e.g. Pamela H. Smith, "Itineraries of Matter and Knowledge in the Early Modern World," in Anne Gerritsen and Giorgio Riello, eds., *The Global Lives of Things: The Material Culture of Connections in the Early Modern World* (London: Routledge, 2016), pp. 31-61.

Moreover, as contributors to this volume have shared and discussed their respective research on individual itineraries, it has gradually become evident that separating the circulation of knowledge from its production was neither fruitful nor indeed possible.¹⁴ Looking at interactions between knowledge and human geographical mobility brings to light the extent to which the construction and circulation of knowledge are intertwined. Studies of the circulation and reception (or lack thereof) of a particular object, be it a book, a theory or a technique, usually take the object as a given. On the other hand, focusing upstream of this process on the construction of the object itself sheds light on the role played by other objects in the construction in question. Thus the geographical mobility of Chinese elites was often a prerequisite for their acquisition of technical knowledge. Not only did techniques pertaining to ceramics or water conservancy have to be acquired or studied in the particular location where they were developed or implemented, but those who possessed and practiced these techniques in the first place were peasants or craftsmen rather than literati. The ability to gather know-how from members of different social strata before constructing it as knowledge—typically by writing a treatise on it for the use of other literati—underlay the establishment of expertise and authority among one’s peers and vis-à-vis one’s superiors and inferiors. Thus, highlighting places of knowledge is one of several ways of integrating the various aspects of the spatial dynamics of knowledge.¹⁵

Another motivation, one stemming from the historiography of imperial China, has prompted us to take location seriously. Just as one no longer considers imperial China as immutable across time, the notion of “China” as an entity uniform across space has been challenged. De-essentializing China has entailed asking “where” as well as asking “when.” Over the last three decades, for example, economic historians have addressed a slightly rephrased version of the Needham problem: why did capitalism develop in Europe and not in China? One of them, Kenneth Pomeranz, has famously chosen the regional scale, comparing Jiangnan 江南 (the Lower Yangzi region) to England rather than two entities as large and diverse as Europe

¹⁴ The role of circulation in the construction of knowledge has been discussed, among others, in Kapil Raj, *Relocating Modern Science: Circulation and the Construction of Knowledge in South Asia and Europe, 1650-1900* (Basingstoke: Palgrave Macmillan, 2007) and in Simon Schaffer, “Newton on the Beach: *The Information Order of the Principia Mathematica*,” *History of Science* 47 (2009), pp. 243-276.

¹⁵ I use the expression “places of knowledge” in the broad sense proposed by Christian Jacob (“lieux de savoir”) in the two volumes he has edited, which have been an inspiration for our project; Christian Jacob, ed., *Lieux de savoir*, vol. 1: *Espaces et communautés*; vol. 2: *Les Mains de l’intellect* (Paris: Albin Michel, 2007, 2011).

and China. His work relies on a large number of local studies.¹⁶ Such studies, advocated by intellectual as well as social and economic historians,¹⁷ have brought out the importance of locality, a concept that has recently been highlighted by historians of medicine.¹⁸ In short, the adjective “Chinese” is no longer regarded as sufficient to characterize, let alone explain, features of societies, groups or individuals and the forms of knowledge that they cultivated. Here again location, not only topographical, but also social and cultural, answered one of our major concerns.

The contributions assembled in this volume seek to study the links between the itineraries of a variety of actors and the dynamics of knowledge, focusing on the last three centuries of the empire. Reflecting on the role of the civil service, it became evident that a specific pattern of geographical mobility characterized the elites among which civil servants were recruited. Typically, a male member of these elites began his career by going to the administrative center of his native district to sit the examination there, then if successful to the capital of his province for a further test, and finally to Beijing for the last part of the metropolitan examination. From there, he would be sent to provinces other than the one from which he originated, in principle changing posts every three years.¹⁹ The role of these officials in the circulation of technical knowledge is well known, especially in the field of agriculture. “Promoting agriculture” (*quannong* 勸農), which was always regarded as one of the tasks of the imperial state, became central to government policy in the eighteenth century. It relied on officials’ knowledge of and engagement with agricultural techniques.²⁰ During the last centuries of the empire, however, successful candidates who went on to

¹⁶ Pomeranz, *The Great Divergence*.

¹⁷ See, e.g., Peter K. Bol, “The Rise of Local History: History, Geography, and Culture in Southern Song and Yuan Wuzhou,” *Harvard Journal of Asiatic Studies* 61.1 (2001), pp. 37-76.

¹⁸ See, e.g., Marta E. Hanson, *Speaking of Epidemics in Chinese Medicine: Disease and the Geographic Imagination in Late Imperial China* (London: Routledge, 2011); TJ Hinrichs and Linda Barnes, eds., *Chinese Medicine and Healing: An Illustrated History* (Cambridge, Mass: Harvard University Press, 2013), pp. 2-3.

¹⁹ On the examination system during the period considered in this volume, see Benjamin A. Elman, *Civil Examinations and Meritocracy in Late Imperial China* (Cambridge, Mass.: Harvard University Press, 2013).

²⁰ See Pierre-Étienne Will, “Of Silk and Potatoes: Efforts at Improving Agriculture in Eighteenth-Century China,” Cornell University, East Asia Program, 8 October 1991; see also Francesca Bray and Georges Métaillé, “Who Was the Author of the *Nongzheng quanshu*?” in Catherine Jami, Peter M. Engelfriet, and Gregory Blue, eds., *Statecraft and Intellectual Renewal: The Cross-cultural Synthesis of Xu Guangqi (1562-1633)* (Leiden: Brill, 2001), pp. 322-359; William T. Rowe, *Saving the World: Chen Hongmou and Elite Consciousness in Eighteenth-Century China* (Stanford: Stanford University Press, 2001), pp. 231-243.

have a career following the pattern sketched above were only a minority among the literati elites. Those who failed in the examinations also travelled extensively, and their itineraries were sometimes crucial in the construction and circulation of technical knowledge. This was the case for Song Yingxing 宋應星 (1587-1666), the author of a major compendium on technology, who repeatedly failed the metropolitan examination.²¹ Mei Wending 梅文鼎 (1633-1721), who played a prominent role in the integration of the mathematical sciences into scholarly learning, did not even pass the provincial examination.²² Moreover, literati were not the only knowledge carriers. Therefore our enquiry has been extended beyond the group of officials, who certainly are the most visible in historical sources. This has enabled us not only to avoid reproducing a bias of some of traditional intellectual history, which focused exclusively on these elites, but also to encompass knowledge whose spatial dynamics differed from that of the careers of civil servants.

The choice to limit the time-span of the contributions in this volume is linked to another aspect of the project: our wish to integrate China into a global history of science. Starting from the seventeenth century, the area of East Asia that had formerly been controlled by the Ming dynasty (1368-1644) played a part in the activities of more than one empire. The most important of these was the Manchu dynastic enterprise, which eventually bequeathed to China a greatly expanded territory, while including it in a multilingual and multicultural empire. The territory of the Ming covered no more than one third of that held by the Qing Empire (1644-1911) in the late eighteenth century.²³ Although Qing expansion was mainly continental, it nonetheless encountered European expansion in several places. Thus Taiwan, disputed between the Dutch and the Spanish in the seventeenth century, was managed by the Qing as a prefecture of Fujian 福建 province after they conquered it in 1684. Also during the second half of the seventeenth century, there were territorial conflicts with Russia, which were resolved by a treaty determining the border between the two empires.²⁴

²¹ On Song Yingxing's work, see Dagmar Schäfer, *The Crafting of the 10,000 Things: Knowledge and Technology in Seventeenth-Century China* (Chicago: The University of Chicago Press, 2011).

²² Catherine Jami. "La carrière de Mei Wending (1633-1721) et le statut des sciences mathématiques dans le savoir lettré," *Extrême-Orient, Extrême-Occident* 36 (2014), pp. 19-47, pp. 25-28.

²³ Peter C. Perdue, *China Marches West: The Qing Conquest of Central Eurasia* (Cambridge, Mass: Harvard University Press, 2005).

²⁴ Jonathan Spence, "The K'ang-hsi Reign," Chap. 3 in Willard J. Peterson, ed., *The Cambridge History of China*, Vol. 9, Part 1, *The Ch'ing Empire to 1800* (Cambridge: Cambridge University Press, 2002), pp. 120-182, pp. 146-147, 151-153.

Manchu conquests entailed a centralization of knowledge on an unprecedented scale.²⁵ Moreover, after 1600, the Jesuit missionary enterprise, supported by Portuguese maritime expansion, gave rise on the one hand to what has been called in China “Western learning” (*xixue* 西學) centered on the mathematical sciences, and on the other hand to an increasingly systematic collection of data on China by Europeans. The Jesuits were the first, but by no means the only Western actors to work on Qing territory.²⁶ During the nineteenth century, the rise of Western colonial powers shaped the circulation of knowledge as much as it did the political history of China. Thus the period under scrutiny in the present volume is one of cross-cultural encounters both within Qing territory and on a global scale. We approach it through various actors who share one feature: their trajectories were at least in part located within the imperial territory.²⁷

The abundance of sources from this period makes it possible to trace the production and circulation of knowledge very precisely in a number of cases. This is not just a matter of geographical coordinates. Space is structured not only by topography and climate, but also politically, socially and culturally. In that light, the present book is divided into three parts. The first part is devoted to the social group whose geographical mobility has been outlined above, namely literati, some of them serving as officials, whose fields of action and places of knowledge were located in various provinces of the empire. The second part focuses on individuals related to the imperial court by patronage, employment or function. The third part considers individuals whose itinerary went beyond the boundaries of China.

Turning to the contents of the first part, we begin the discussion with literati who were specialists in medicine, few of whom were officials. Florence Bretelle-Establet discusses the circulation of knowledge among those experts who lived in the provinces of Guangxi and Guangdong (sometimes known as the ‘two Guangs’, Liangguang 兩廣) in the eighteenth and nineteenth centuries. As is well known, medical apprenticeship took place in

²⁵ See Laura Hostetler, *Qing Colonial Enterprise: Ethnography and Cartography in Early Modern China* (Chicago: The University of Chicago Press, 2001).

²⁶ Catherine Jami, *The Emperor's New Mathematics: Western Learning and Imperial Authority During the Kangxi Reign (1662-1722)* (Oxford: Oxford University Press, 2012); Isabelle Landry-Deron, *La Preuve par la Chine: La “Description” de J.-B. Du Halde, Jésuite, 1735* (Paris: Éditions de l'École des Hautes Études en Sciences Sociales, 2002); Fa-ti Fan, *British Naturalists in Qing China: Science, Empire, and Cultural Encounter* (Cambridge, Mass.: Harvard University Press, 2004).

²⁷ Another such case is studied in Wu, Huiyi, “Les traductions de François-Xavier Dentrecolles (1664-1741), missionnaire en Chine: localisation et circulation des savoirs,” *Extrême-Orient, Extrême-Occident* 36 (2014), pp. 49-80.

private contexts, in a master-student relationship or between family members, as well as through books. She thus addresses two questions: what did medical experts living in the “Far South” know about medicine? How far and by what means did they become acquainted not only with the medical tradition of their local areas, but also with the traditions of such core zones of intellectual life and medical expertise as the Jiangnan region? She undertakes a systematic survey of the medical literature produced by He Mengyao 何夢瑤 (1693-1764), an outstanding figure of eighteenth-century Guangdong, and by his little-known contemporaries of the “two Guangs,” with a particular attention to the networks of citations and quotations that reveal something of the resources available to them. She then explores the channels through which medical doctrines and practices circulated. Besides the development of the local book trade, the geographical mobility of these experts themselves, for reasons as diverse as imperial examinations, the quest for a master from whom to learn medicine, and wars, also favored the importation and local reprinting of books written far away. This mobility also enabled literati to gain easier access to new doctrines and texts that might then appear in locally produced books in the form of citations or quotations.

Like all agricultural activities practiced by peasants, sericulture was a concern of literati, officials, and the imperial state as a whole. Mau Chuanhui analyzes the complex process by which the production of wild silk, and more specifically the technique of wild silkworm rearing first developed in Shandong, was implemented in other provinces of the empire from the seventeenth to the nineteenth century, first at the initiative of natives of that province, mostly officials but also migrant commoners. In 1744, the Qianlong emperor (r. 1736-1795) ordered the Shandong Provincial Governor to compile what was effectively the first manual devoted to wild silk production, thus contributing to imperial promotion of its development. The texts written on this subject during the first two centuries of the Qing dynasty bear witness to the construction of mobilized knowledge in written form. Mau shows that official efforts enjoyed varying degrees of success. Whereas in some places, the technique failed to take root, others, like Zunyi 遵義 in Guizhou province, eventually became long-term centers of production whose wild silk cloth enjoyed a reputation that extended throughout the empire. The geographical mobility of objects such as silkworm eggs and books was combined with that of human beings, whose mobility was often orchestrated by the imperial administration, and thus made the circulation of wild silkworm rearing production techniques possible.

Water conservancy was another type of technology as famously important to the imperial state as sericulture. Delphine Spicq approaches this

topic through an inquiry into the official career and writings of Linqing 麟慶 (1791-1846), a Manchu bondservant (*baoyi* 包衣, from the Manchu *booi*). His relationship with the emperor was thus in principle one of servitude, although he was of imperial descent. While receiving the classical Chinese education that befitted the rank of his family, Linqing became familiar with water conservancy technology when accompanying his grandfather, then Governor of Henan, on the latter's inspection tours of local water courses, which included the Yellow River. He later held several posts in which he was in charge of water conservancy works, including most notably those of the Southern section of the Grand Canal and its intersection with the Yellow River, a point of strategic importance in the transportation of the tribute grain from Jiangnan to the capital. While holding this post, Linqing wrote two technical works. The first one gave an illustrated description of the tools necessary for the maintenance of waterworks; the second one traced the history of the intersection between the Yellow River and the Grand Canal. The analysis of four maps found in the latter work enables Spicq to show how Linqing constructed historical knowledge of the technology he mastered, through both fieldwork and the gathering of archival materials. The process of his knowledge construction brings out the role of both riverbanks and administrative offices as places of knowledge: locality, and more specifically movements back and forth between these two places of knowledge, is crucial here. Moreover, in his writings, Linqing combined what had hitherto been transmitted as oral know-how and through the records stored in local archives, transforming it into printed knowledge intended for a wide readership of literati-officials.

The second part of the book introduces a Chinese bondservant of the Qing court and an emperor. Qing emperors relied heavily on the Chinese civil service for information as well as for administration. However, some crucial posts were held by members of the Imperial Household Department (Neiwufu 內務府), whose activities reached well beyond the Forbidden City.²⁸ The itinerary of Tang Ying 唐英 (1682-1756), a Chinese bondservant of the imperial family studied by Zhao Bing in her contribution, provides a striking illustration of the role of such imperial agents. Entering imperial service at the age of sixteen, Tang Ying served three emperors in succession: Kangxi 康熙, Yongzheng 雍正 and Qianlong 乾隆. From 1697 to 1728, he worked at the Palace Board of Works (Zaobanchu 造辦處) in Beijing. From 1728 to the end of his life, he held posts outside the capital, first at the Jingdezhen 景德鎮 porcelain manufactory, then at imperial cus-

²⁸ Evelyn S. Rawski, *The Last Emperors: A Social History of Qing Imperial Institutions* (Berkeley: University of California Press, 1998), pp. 178-182.

toms in the same region. Relying on both imperial archives and Tang Ying's private writings, Zhao follows his career, showing how he constructed his authority as an expert vis-à-vis both craftsmen and the Qianlong emperor by learning from the former the details of the production process. Locality, rather than mobility, was crucial again at this juncture. It was during his prolonged residence in Jingdezhen that Tang acquired his knowledge. This knowledge then enabled him to supervise the production of objects according to imperial taste while he was in charge of imperial customs located at some distance from Jingdezhen. He thus worked in a triangular space, ensuring the implementation of imperial orders regarding porcelain, and managing the work and lives of the artisans.

Emperors could play a role other than that of mere patrons in the construction of knowledge, and may thus deserve study in their own right in the context of this volume. Whereas late Ming emperors remained within the Forbidden City, imperial mobility is a well-known feature of the Kangxi (1662-1722) and the Qianlong (1736-1795) reigns. The analysis of a collection of jottings printed posthumously, the *Kangxi Collection of the Investigation of Things in Leisure Time* (*Kangxi Jixia gewu bian* 康熙幾暇格物編) enables Catherine Jami to explore the ways in which Kangxi combined information variously acquired through his unique position with what he found in Chinese books, and thus to construct what may be called "imperial learning." By such means he contributed to literati learning remarkably diverse elements concerning the imperial territory, as well as regions yet to be conquered and the world beyond them. These elements included information about plants and technological artifacts, goods from beyond the Great Wall and dialects of the Chinese provinces. The emperor staged himself as a close observer of the lands across which he travelled and of their populations. Tributaries from Inner Eurasia, Jesuit missionaries and merchants involved in global trade, as well as his network of informants and envoys also played an important role by providing information. In other words, the itineraries of those at his command as well as his own travels, and the networks to which they belonged were crucial in his acquisition of the unique information that he input into his "investigation of things" (*gewu* 格物). While this information enabled Kangxi to read some Chinese historical sources critically, he never challenged the authority of orthodox authors such as Zhu Xi 朱熹 (1130-1200), the founding figure of the Neo-confucian philosophical school. Indeed this authority played an essential role for him as a Manchu in establishing his jottings as part of Chinese scholarship.

The contributions in the third part of the book follow itineraries that take us beyond the borders of the empire, to movement at a regional or Eurasian

scale. Some of the actors involved brought to China knowledge acquired elsewhere, while others provided Europe with knowledge gathered in China.

The itineraries of Jesuit missionaries who worked in China were sometimes complex. This was the case for the French Jesuit temporal coadjutor²⁹ Bernard Rhodes (1646-1715), on whom Beatriz Puente-Ballesteros's contribution sheds unprecedented light. Like a number of technical specialists sent to China by the Society of Jesus, Rhodes became a professional, in his case a medical practitioner, before being recruited to the Society. For nine years his itinerary between Europe and Asia was that of a French missionary subject to the hazards of European colonial rivalries. However, once he arrived in Beijing in 1699, he entered the service of the Kangxi emperor as a medical practitioner, and as such was attached to the imperial court. From then on, his itinerary seems to have been determined exclusively by this service. Through his moves within the capital and in the emperor's retinue, one gets a glimpse of what the position of court physician entailed not only for Europeans, but also for the specialists practicing various therapeutic techniques originating from different parts of the Qing Empire, all of whom put their skills at the emperor's disposal. They seem to have worked in competition rather than to have shared knowledge and practice among themselves. Thus Rhodes's career in China illustrates the fact that the presence there of Europe-trained medical practitioners did not in itself entail a transfer of knowledge.

The knowledge flow between the two ends of Eurasia under Jesuit agency went in both directions. Antonella Romano focuses on the trajectory of an Italian Jesuit, Martino Martini (1614-1661) between 1640 and 1660, when he carried along with him knowledge of China (in the form of Chinese books) to Europe. Once there he famously published two historical works—one on ancient history, the other on the Manchu conquest—and an *Atlas* of the Empire. As a missionary in Jiangnan, Martini witnessed the Manchu conquest there; he was then sent back to Europe to defend the Jesuits' evangelization strategy. It was during his long and risky return journey that he seems to have done most of the writing for his three books. Before reaching Rome, he chose to spend some time in Northern, mainly Protestant, Europe, where he ensured their publication. These works played a major role in updating European knowledge of China. While his atlas of China was the first one printed in Europe, his *De Bello Tartarico*, published ten years after the fall of Beijing to the Manchus, gave a detailed account of the Qing conquest

²⁹ In contrast with Jesuit fathers, "temporal coadjutors" (brothers) were not ordained priests. They usually assisted the priests by undertaking more "worldly" (temporal) tasks: in the Jesuit mission to China, they might follow artistic and technical professions such as medicine, painting or clock-making.

of China, aimed at legitimizing their rule, and therefore the Beijing Jesuits' allegiance to them, at a time when other Jesuits, based in Southern China, still favored support for the Southern Ming. Romano's close and contextualized reading of his books shows how Martini constructed his authority as an expert on China's history and geography, emphasizing his own reliance on Chinese sources—which no one else in Europe was able to read at the time. Moreover, linking Martini's production of knowledge of China for European readers with his itinerary highlights the spatial complexity of both ends of the Eurasian continent in the middle of the seventeenth century and the need to take this into account to understand each of them as well as the ways in which they related.

Two and a half centuries later, after the Qing defeat by Japan in 1895, the latter came to be a major place of knowledge for those involved in reforming China. Andrea Bréard analyzes the careers of two individuals born in the same prefecture at only two years' interval. Each of them belonged to one of the two groups involved in the modernization of statistics—a term whose multiple meanings at this particular historical juncture she discusses—as a tool for statecraft. Meng Sen 孟森 (1868-1937), then a young activist for constitutional reform who went to Japan to study law, translated from Japanese into Chinese a statistical manual that became the first and most influential early twentieth century book on the subject in China. He promoted the introduction of social statistics, not only to gather information for the state archives, but also as an objective tool for analyzing societal phenomena, in order to serve the process of legal, political and educational reform. Shen Linyi 沈林一 (1866-1911?) finished his official career as Director of the first Central Statistical Bureau (Tongjiju 統計局) from its foundation in 1907 until shortly before the fall of the Qing Empire. Bréard argues that, whereas Shen followed the traditional path of an official career, Meng's itinerary diverged from it to construct a career more typical of a “modernizer.” However, rather than just contrasting these two figures as representatives of two opposed groups, she follows their geographic and social traces in an intertwined fashion, showing how their respective itineraries correspond to complementary visions of statistics, both of which were instrumental in institutionalizing a new field of social science.

The twentieth century also saw instances of circulation of knowledge from East Asia to Europe. Lucia Candelise analyses one such case, discussing the ways in which certain Frenchmen versed in acupuncture constructed their legitimacy as experts on the ground of their having worked in Asia with native experts. The most famous of them, George Soulié de Morant (1878-1955), was a former employee of the French Ministry of Foreign Affairs who spent some years in China as a translator. Historical evidence,

however, suggests that he did not learn acupuncture in China from Chinese doctors, as he later claimed, but in France, from the Japanese founder of macrobiotics in Europe, who was versed in Chinese medicine. Still, the “founding myth” of French acupuncture represents it as a body of knowledge acquired at its very source in China. Soulié de Morant introduced acupuncture to a circle of physicians interested in homeopathy and neo-Hippocratic medicine. He practiced it first under their supervision in hospitals, and then independently, which laid him open to attacks for illegal exercise of medicine. The attacks came from one of the physicians whom Soulié de Morant initiated into acupuncture, Roger de La Füyé (1890-1961), who was the mainspring of the institutionalization of acupuncture within French medicine. One of La Füyé’s students, Albert Chamfrault (1909-1969), a military physician, in turn undertook the translation of Chinese medical classics with the help of a scholar of the Chinese community of Indochina during the three years he spent there. While his claim to expertise was, like that of Soulié de Morant, based on locally acquired knowledge, Chamfrault’s approach was radically opposite. He emphasized the ancientness and the otherness of the practice that Soulié de Morant had striven to integrate into twentieth-century French medicine. On the whole, then, Indochina, rather than China, was the crucial place of knowledge in the construction of French acupuncture.

The subjects discussed in these nine contributions raise many interesting issues. However some important questions remain to be addressed. Only two women occur in the present book: the Kangxi emperor’s Mongolian wet-nurse Sumala, who was one of Rhodes’s patients, and Mrs Xu, the wife of Xu Jieping 徐階平, who taught the women of the district where her husband held office how to weave wild silk.³⁰ This last example suggests that women need to be studied as agents of technical change. Also, as mentioned above, the Qing Empire was multilingual; the use of Manchu, Mongol and Tibetan in writing technical knowledge is certainly worth putting on the map.³¹ Our aim was not to be exhaustive, nor was it possible for us to be, given the vast spatial as well as temporal extent covered by our investigations. Rather, our aim was to systematically bring space into our research and to problematize it, looking at different modalities of the spatial dynam-

³⁰ See below Mau, p. 82 n. 80, and Puente-Ballesteros, pp. 221-226.

³¹ Lobsang Yongdan, “The Translation of European Astronomical Works into Tibetan in the Early Eighteenth Century,” *Inner Asia* 17 (2015), pp. 175-198; see also Catherine Jami, “Imperial Science in Manchu in Early Qing China: Does it Matter?” in Florence Bretelle-Establet, ed., *Looking at it from Asia: The Processes that Shaped the Sources of History of Science* (Dordrecht: Springer, 2010), pp. 371-391.

ics of knowledge and using different types of sources and angles to approach the question.

While these contributions concern a range of subjects relevant to the history of science, technology and medicine, they also propose varied approaches to the question under scrutiny. Some of them focus on an individual (Spicq, Zhao, Jami, Puente-Ballesteros and Romano), while others take into consideration a group of two or more persons involved in a particular field (Bretelle-Establet, Mau, Bréard and Candelise). The choice of most is to follow individual itineraries. On the other hand, the itineraries Mau explores are those of techniques rather than of persons; she discusses how human geographical mobility contributed to the relocation of these techniques. Jami sheds light on journeys by a number of persons (including the emperor himself) whose varied ranges of mobility underlie the construction of imperial knowledge. Bretelle-Establet adopts a prosopographical approach, and then highlights one individual against the background of the group to which he belongs. These two last contributors, as well as Spicq and Zhao, analyze the ways in which location and movement relate to the organization of information in texts.

Puente-Ballesteros's contribution concerns an individual, Bernard Rhodes, belonging to a religious order, whose itinerary before he came under court patronage appears to have been determined by that order. That he does not seem to have shared, let alone disseminated, his skills in places where he exercised them highlights one important point: the fact that technical specialists practice in a certain place does not necessarily lead to the circulation of their skills in that place. In fact, the exercise of skills by craftsmen and their transmission (mostly from master to apprentice) are two separate issues. Rhodes, the Jesuit physician working for a Manchu emperor seems to have kept his skills to himself. Indeed, these skills were all the more valuable as they were not widely shared. His activities therefore constitute a display of the far-reaching power of his imperial patron. This case enables us to highlight the distinction between the availability of technical skills, embodied in individuals, who may or may not pass them on, and the construction of knowledge in written form. The latter is done by observers (Linqing, Tang Ying or the Kangxi emperor) who then assume the status of experts in relation to their intended readership.³² They translate the knowledge embodied in craft skills into a language that enables it to circulate among literati. This translation in turn may help other literati to manage

³² This point has been argued convincingly in Christian Lamouroux, "Le travail artisanal en Chine (x^e-xii^e siècles): entre curiosité lettrée et expertise bureaucratique," *Revue de Synthèse* 131, no. 2 (2010), pp. 167-192.

craftsmen. It does not, however, suffice to ensure the reproduction of the skills described in it, nor is it intended for that purpose. For it is not the skills themselves that circulate in books, but knowledge *about* these skills. Craftsmen do not need the writings produced by expert literati in order to train apprentices in their craft. Thus, in a number of fields, technical knowledge appears as the result of an appropriation by the literati class of knowledge embodied by members of other classes. In this respect it contrasts with classical learning, which is handed down from generation to generation among literati and legitimizes their status as holders of universal knowledge.

Another feature shared by two of the actors studied in this book deserves attention. Both Tang Ying and Linqing were bondservants, and both constructed their careers by cultivating and implementing in a particular location expertise previously acquired elsewhere, in the Imperial Palace for the former, in Henan where his grandfather held a post for the latter. It is this expertise that ensured their efficacy in the posts they held. Through his jottings, the Kangxi emperor constructed an image of himself similar to those of these two men, scholars versed in statecraft who combined reading with observation made in the field. He seems to have tried to present himself as the personification of the perfect official: a scholar interested in technical matters who puts his learning in the service of statecraft—the kind of scholar-official, in fact, that has inspired the project whose results are presented in the present volume.

The contributions in this volume scrutinize their topics at different scales, which are determined by the circumstances and activities of the actors considered. Bretelle-Establet's chapter sheds light on the local history of the "two Guangs." Mau shows how the geographical mobility of natives of Shandong province initiated the dissemination of a technique to other areas of the empire in which trees similar to those of Shandong could provide food for wild silkworms. More broadly than the Qing Empire, East Asia is a relevant scale for the analysis of the links between individual itineraries and the spatial dynamics of knowledge: Bréard shows that this scale should be considered jointly with that of the empire itself.³³ Puente-Ballesteros, Romano and Candelise consider the Eurasian scale. All three,

³³ Some of the contributions in Jami, ed., "Mobilité humaine et circulation des savoirs" also consider this scale: Lim Jongtae, "Journeys of the Modest Astronomers: Korean Astronomers' Missions to Beijing in the Seventeenth and Eighteenth Centuries," pp. 81-108 and Mathias Vigouroux, "Commerce des livres et diplomatie: la transmission de Chine et de Corée vers le Japon des savoirs médicaux liés à la pratique de l'acupuncture et de la moxibustion (1603-1868)," pp. 109-154; see also Marion Eggert, Felix Siegmund, and Dennis Würthner, eds., *Space and Location in the Circulation of Knowledge (1400-1800): Korea and Beyond* (Frankfurt: Peter Lang, 2015).

however, focus on both ends of the continent as well as bringing in regions that one would not necessarily expect. Thus Rhodes, the Jesuit physician working for the emperor of China, had first been active in the French colony of Pondicherry; Martini, who was Italian, chose to have his writings on China published in Northern Europe; what the French thought of as an essential branch of “Chinese medicine” was in fact introduced into France by way of Japan, and, even more significantly, by way of the French colony of Indochina. Here we hope that our collective project has reached what was one of its major goals. Our approach to the history of knowledge, elaborated on the basis of questions that are specific to the historiography of science in China, enables us to propose a way to integrate China into a global, connected history of knowledge, in terms that could fruitfully be applied to other parts of the world.³⁴ In other words, we have demonstrated that it is relevant and fruitful to apply the same kind of analysis to actors that are regarded as pertaining to an “internal history of China” and to those who played the role of intermediaries between China and “the rest of the world.” There is no point in separating an “inside” from an “outside,” as we are dealing with a single, albeit heterogeneous historico-geographical space. In following individual itineraries, we have examined encounters between local cultures within the empire and encounters between one or several of these cultures and those of other geographic areas. To pursue this line of argument to its conclusion, the question of the links between human geographical mobility and the spatial dynamics of knowledge can afford new insights in the history of science whatever the area of the world studied.

Focusing on these links has entailed reflecting on the possible uses of maps in the history of knowledge. Our project led us to explore how far one can go in constructing a cartography of knowledge: is it possible to give a literal meaning to this phrase? Art historians as well as cultural historians have produced atlases of their own topics.³⁵ On the other hand, while the

³⁴ Recent contributions in that field include Bernard Lightman, Gordon McOuat and Larry Stewart, eds., *The Circulation of Knowledge Between Britain, India and China: The Early-Modern World to the Twentieth Century* (Leiden: Brill, 2013); Ofer Gal and Yi Zheng, *Motion and Knowledge in the Changing Early Modern World: Orbits, Routes and Vessels* (Dordrecht: Springer, 2014); and Pilar González Bernaldo, and Liliane Hilaire-Peréz, eds., *Les savoirs-mondes: Mobilités et circulation des savoirs depuis le Moyen Âge* (Rennes: Presses Universitaires de Rennes, 2015). On connectedness and the writing of global history, see Sanjay Subrahmanyam, “Par-delà l’incommensurabilité: pour une histoire connectée des empires aux temps modernes,” *Revue d’histoire moderne et contemporaine* 54, no. 4bis (2007), pp. 34-53.

³⁵ See, among others, John Onians, *Atlas of World Art* (London: Laurence King Pub., 2004); Nicolas Fiévé, ed., *Atlas historique de Kyôto: Analyse spatiale des systèmes de mé-*

importance of space in the history of science is increasingly felt,³⁶ maps do not yet feature among the tools commonly used by historians of science, even when they put space at the core of their investigation. Rather, they seem to focus on representations of space in history.³⁷ Our attempts yielded a variety of maps.³⁸ The first kind of maps that were drawn as part of the project were maps of individual itineraries (as in the contributions of Bretelle-Establet and Zhao).³⁹ Such maps play at the very least a useful heuristic role. Maps can also be valuable as recapitulations of stories of circulation of techniques, as in the case of wild silkworm rearing analyzed by Mau.⁴⁰ With this second kind of maps we are beginning to approach a possible sense of a cartography of knowledge. However, maps can also be used to visualize information that relates to the content of books, and these form the third kind of maps found in the present volume.⁴¹ Thus Florence Bretelle-Establet's quantitative analysis of quotations in the medical texts produced in Guangdong and Guangxi in the eighteenth and nineteenth centuries are represented on maps that literally show what being peripheral means: only very few authors quoted in such texts came from these provinces. Moreover, taking into account the dates of the texts quoted enables one to visualize two successive shifts of the main centers of production of medical texts in imperial China. Unsurprisingly, these main centers corre-

moire d'une ville, de son architecture et de son paysage urbain (Paris: UNESCO/Éditions de l'Amateur, 2008).

³⁶ Jean-Marc Besse, "Approches spatiales dans l'histoire des sciences et des arts," *L'Espace Géographique* 39 (2010), pp. 211-224.

³⁷ See David N. Livingstone, *Putting Science in Its Place: Geographies of Scientific Knowledge* (Chicago: The University of Chicago Press, 2003); Christian Jacob, ed., *Lieux de savoir*, vol. 1: *Espaces et communautés* (Paris: Albin Michel, 2007); Diarmid A. Finnegan, "The Spatial Turn: Geographical Approaches in the History of Science," *Journal of the History of Biology* 41 (2008), pp. 369-388.

³⁸ The maps were drawn by Antoine Fivel; we used the dataset provided by the Chinese Historical GIS developed by Harvard University (<http://www.fas.harvard.edu/~chgis/>) and Fudan University (http://yugong.fudan.edu.cn/views/chgis_index.php?list=Y&tpid=700). The data collected as part of our project used for these maps were stored on the ICCM database, a simplified version of which can be accessed at <http://iccm.huma-num.fr/>.

³⁹ Maps 1.4, and 4.1.

⁴⁰ Map 2.1.

⁴¹ This kind of visualization supplements the better-known diagrams representing social networks; see, e.g., Jonathan Porter, "The Scientific Community in Early Modern China," *Isis* 73, no. 4 (1982), pp. 529-544, see esp. pp. 540-541. See also Hilde de Weerd's diagrams of networks of patronage, <http://chinese-empires.eu/blog/away-day-for-the-state-and-society-network-at-lia/>. These diagrams have also been used to represent knowledge, especially by de Weerd in her study of Song dynasty notebooks (*biji* 筆記); see https://www.mpiwg-berlin.mpg.de/en/research/projects/NWG_Schaefer_Hilde_de_Weerd6-14; see also her database of notebooks at <http://chinese-empires.eu/static/media/uploads/database/index.html>.

respond to what we know to be the culturally dominant areas of the empire at different times. Thus the vast majority of Ming and Qing texts quoted by Guangdong and Guangxi authors were written in Jiangnan.⁴² Cartographic representation produces a striking image of what location at the political, economical and cultural periphery implies in the history of knowledge. It is no coincidence that these two provinces are also peripheral in the map of the things investigated by the Kangxi emperor. These maps represent other aspects of the topography of knowledge in the Qing Empire, on a slightly larger scale and in a different way. Most of the objects and techniques whose location is mentioned in the *Kangxi Collection of the Investigation of Things in Leisure Time* are located either in places visited by the emperor during one of his many inspection tours in the Chinese provinces, or in territories beyond the Great Wall either under Qing control by the end of the Kangxi reign, or that were to be conquered by his grandson, the Qianlong emperor. Thus the geography of Kangxi's interests is that of imperial expansion and, still further, of globalization. Map 5.2 enables us to see how the imperial network of informants extended the range of imperial field observation. Finally, categorizing the different "things" investigated by the emperor reveals the prominent place occupied among them by plants, waterworks and techniques. Imperial scholarship was indeed strongly oriented towards statecraft.⁴³

Thus the maps in this volume represent individual itineraries, as well as the spatial dynamics of knowledge, and, in some cases, bring out the ways in which the two can relate to one another. Maps can at the very least serve heuristic purposes and provide visual representations of arguments presented in the conventional, sequentially written, historical mode of discourse. Furthermore, when they encapsulate large quantities of data, they can also provide evidence at a glance for quantitative claims. For specialists of the history of science, technology and medicine in imperial China—as for scholars in many other fields—maps can thus provide an all too often missing link between the two ends of the spectrum of research. On the one hand, scrupulous, sophisticated textual analysis of sources lies at the heart of history of science, and on the other hand we feel compelled to make general claims and arguments on big issues. The question that underlies the essays that follow is just such a big issue: our aim in these essays is not to put forward a single, general model of how the itineraries of actors shaped the construction and circulation of knowledge, but rather to show that a spatial approach to knowledge in history is both fruitful and necessary, for China as for the rest of the world.

⁴² See Maps 1.2 and 1.3.

⁴³ See Map 5.3.