Introduction from the Guest Editor

The history of the circulation of scientific knowledge and practice between Europe and China in the early modern age has long been at the margins of several fields. Needham’s attempt at a “titration” of the contributions of the Chinese civilisation to universal science, as well as the traditional emphasis on discovery and priority in the history of science have resulted in an almost exclusive focus on the period up to 1600 in writing the history of science in China.1 On the other hand, historians of Christian missions have generally considered the Jesuits’ engagement in the sciences in China as a marginal, somewhat over-advertised phenomenon. However, interest in the cross-cultural circulation of knowledge as well as in the Society of Jesus as an actor of early modern science in Europe and beyond have given a new context for this field, which is now regarded as relevant to the study of the sources of Chinese modernity, taken as a phenomenon to be defined in its own terms rather than as an imperfect imitation of Europe. At the same time, acknowledging the impossibility of drawing a clear-cut dividing line between what pertained to “science” and what pertained to “religion” in the Chinese writings of the Jesuits has resulted in redefining the field. While the present volume focuses on China, broadening the scope of study to include Korea and Japan also opens out the theme beyond the archetypical face-to-face between Europe and China, to become an aspect of the history of the worldwide circulation of knowledge in the age of European expansion.2 Research on hitherto unknown or unstudied material has appeared, mostly consisting of explorations of Chinese sources, but also including investigations of printed and manuscript sources in European languages. This mass of publications is providing a more and more detailed and nuanced picture of the ways in which the Jesuits taught and practiced the sciences in China, and of how this contributed to shaping late imperial science. Perhaps the most promising trend is the systematic combination of sources of both East Asian and European origins; in this effort collaboration is called for, as mastery of the various languages used in these sources and of their technical contents needs to be combined with an understanding of their contexts.

The four articles in the present volume are based on papers read at the 11th International Conference on the History of Science in East Asia in Munich, 15-20 August 2005. During this conference, while listening to the three colleagues who agreed to contribute to this issue (and to some others), I became aware of the

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1 “[…] for our present plan the year 1600 is the turning point, after which time there ceases to be any essential distinction between world science and specifically Chinese science […]” see Needham, Joseph, Science and Civilisation in China, vol. 3, Cambridge: Cambridge University Press, 1959, p. 437.

2 A workshop on “Comparative Perspectives on the Introduction of Western Science into East Asian Countries in the late Chosôn Period” held in Seoul in October 2007 showed the fruitfulness of adopting this broader perspective. For the programme of this workshop, see: http://e-kyujanggak.snu.ac.kr/util.DownloadServlet?dtype=1&id=527
extent to which our understanding of Western learning (西学) in late Ming and early Qing China has changed in the more than twenty years since I started working in this field. I will not attempt here an exhaustive description of the changes as I see them, for fear of not doing justice to all those who have contributed to them. Instead readers will find in the articles of the present volume examples of the questions we face and of the wider range of sources that are now brought into play to answer them. The first two articles (Hsu, Shi) shed further light on Western learning as an object of study and debate between the Jesuits and Chinese literati and among the latter; the last two (Lü, Jami) focus on the integration of the Jesuits and of their sciences into Qing imperial institutions and learning.

It is widely known that whereas the mathematical sciences introduced by Matteo Ricci (1552-1610) mainly relied on Clavius’ (1538-1612) teaching at the Roman College, the natural philosophy that he presented belonged to the Aristotelian tradition. Emphasis has usually been put on the contradictions between this tradition and the Neo-Confucian one within which late Ming scholars operated. Certainly the most famous contradiction, pointed out by Ricci himself, is that between the Four Elements (which Ricci rendered as 四元四 元 行) and the Five Phases (五行五 行) Hsu Kuang-Tai shows that when proposing to substitute the latter with the former, Ricci borrowed ideas developed in a scholarly lineage that went back to the Song philosopher Shao Yong 邵雍 (1011-1077), who challenged the Five Phases system and proposed instead a system of Four Forms (四象 四象 or 四體 四 體). Ricci had become familiar with both systems by studying the Classics and the Song to Ming commentaries, and from discussions with literati. Moreover, on the basis of his own reading of the Shang-shu 尚書 (Book of Documents), he further claimed that the Five Phases were relevant to life after Creation whereas all things created were composed of the Four Elements. He thus characterised the Four Elements as 体 (often rendered by “substance”) or 源 ("origin") and the Five Phases as 用 ("function") or 流 ("development"). Hsu suggests that as this claim implied that Western learning predated Chinese learning, it may well have triggered in response the idea of the “Chinese origin of Western learning” (西学 中源). This “accommodation” was part of the integration of Western learning into Chinese scholarship, a process that, as Hsu Kuang-Tai shows, was initiated by the Jesuits themselves.

Whiggish dissatisfaction with the Jesuits’ use of Tycho Brahe’s geocentric model at the time of the Calendar Reform has long been the main reason why historians of astronomy have investigated Nikolaus Smogulecki (1611-1656), believed to have been an advocate of heliocentrism, and the Tianbu zhenyuan 天
Catherine Jami: Introduction

步真原 (True Principles of the Pacing of the Heavens), a treatise that he co-authored with Xue Fengzuo 薛鳳祚 (1600-1680) in Nanjing in 1653. Xue later published it as part of his Lixue huitong 曆學會通 (Integration of Calendrical Studies). By comparing all known extant copies of the latter work, Shi Yunli studies the context and reception of Smogulecki’s work, and brings out the full historical significance of the latter’s teaching in astronomy and astrology. Relying on the work of Philippe van Lansberge (1561-1632), the Polish Jesuit proposed an alternative to Tycho’s system. This in turn provided technical grounds for Xue Fengzuo’s challenge to Qing official astronomy; Xue undertook an integration of the no less than five astronomical systems available to him. Shi also identifies the author of the preface to the Tianbu zhényuan 天步真原 as being the famous scholar Fang Yizhi 方以智 (1610-1671), on the grounds that the signature after the preface can be decoded as “[Yi]zhi, a free man of the Ming”. In the light of all this, Smogulecki’s partial conveying of Lansberge’s criticism of Tycho appears to have provided Ming loyalists with an alternative to the Qing calendar. Thus, among other things, Shi gives multi-layered evidence that, in the context of dynastic transition, Smogulecki’s teaching in Nanjing did not challenge geocentrism, but rather the newly established imperial order that his confrères who served in Beijing were helping to build.

Challenges to the idea that the Beijing Jesuits’ astronomical methods were adopted by the Qing state dynasty solely on the grounds of their overwhelming superiority in predicting phenomena have previously come from the side of social history of science. Here Lü Lingfeng uses statistical analysis of the data found in extant memorials concerning eclipses to throw further light on the complex links between the technical dimensions of official astronomy and its ritual implications. Indeed the standard error in the calculation of eclipses using the Western method was less than that of the Datong 大統 system used up to 1629. However, in some cases the latter yielded better predictions than the former. Thus for the famous eclipse of 21 June 1629, which according to official sources triggered the calendar reform, the Jesuits’ prediction was worse than that of official astronomers. Rather than being a decisive test proving the superiority of the Western method, this eclipse simply provided an opportunity to issue the decision of reforming the calendar, which had been made earlier. Lü further shows that the most significant improvement of predictions during the Qing dynasty does not date to any “calendar reform”, but to 1731, when official astronomers started using the methods that were officially endorsed only in 1742, with the publication of the Lixiang kaocheng houbian 曆象考成後編 (Later Volumes of the Thorough Investigation of Calendrical Astronomy). However, despite the figures yielded by statistical analysis, error in prediction was never an issue for Qing official astronomers: Lü shows that since the 1670s the data given in official reports of observation of eclipses were in fact directly copied from the predictions submitted before each eclipse. Once the Jesuits were firmly in place, the normal practice of imperial astronomers became ritual rather than “scientific”.
This was indeed a major change in the tradition of the Astronomical Bureau, but hardly one that brought it closer to the practice of European astronomers of the time. This change can be seen as a result of a shift in the understanding of eclipses brought about by the Jesuits: eclipses were henceforth regarded by specialists as resulting from regular celestial motion that could be described by mathematical procedures. Confident in the method they used, official astronomers thus continued to fulfil their role in the organisation of eclipse-related rituals.

The Kangxi emperor (r. 1662-1722) was among those who most strongly supported Jesuit astronomy. His personal involvement with Western learning and role in its appropriation by the state are well known: astronomy and cartography are the most famous examples of how the Jesuits’ skills were put in the service of statecraft during his reign. In my article I argue that Kangxi’s appropriation of Western learning also aimed at integrating the mathematical sciences into imperial scholarship. His study of the sciences with the Jesuits was modelled on that of the Classics that he pursued with Daily Tutors (rijiangguan 日講官). He also asserted himself as a scholar: his application of his measurement of the propagation of the sound of cannon with a pendulum to the investigation of things (gewu 格物) exemplifies the way in which he used data and methods provided by his Jesuit tutors, on which he had an effective monopoly, to contribute to scholarship as understood in the traditional Chinese sense; for the things he thus investigated pertained to historical records—ancient unit standards—as well as to the natural world—thunder. The compilation of an imperial textbook of mathematics, the Yuzhi shuli jingyun 御製數理精藴 (Essential Principles of Mathematics Imperially Composed, 1723) put the finishing touches to the integration of mathematics into imperial learning as well as to the emperor’s construction of himself as a teacher in the Confucian tradition.

These four articles offer some unexpected glimpses of the scene of Western learning in China: Matteo Ricci using Shao Yong’s legacy to introduce Aristotelian cosmology, and thereby initiating a priority quarrel between Chinese and Western learning; a (most likely) Copernican missionary providing Ming loyalists with an alternative to Jesuit astronomy as adopted by the Qing dynasty; a Jesuit official astronomer presiding over the abolition of the millennium-old practice of confronting prediction with observation; and a Manchu emperor drawing on European informants to contribute to the investigation of things and thereby asserting himself as a scholar in the Chinese tradition. Together these glimpses suggest the complexity of the scene. The research that underlies them exemplifies the fruitfulness of combining philology and meticulous analysis of the technical texts on which historians of science traditionally focus with the broader perspective of social and cultural history. On one important point the conclusions of these studies converge: they all show how in different times and places Western learning was produced in processes of multiple interactions.

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