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As Catherine Pagani, for example, has done for elaborate clockwork mechanisms and their technology, 1 Emily Byrne Curtis, an independent scholar and author of several treatises on Chinese glass (including the 2004 monograph Pure Brightness Shines Everywhere: The Glass of China) focuses in one of her more recent publications on different aspects of the exchange of this versatile material between Europe and China in the period from 1550 to 1800. In addition to the main text, this comparatively brief study comprises a chronology of Chinese history, a glossary with Chinese characters, a select bibliography and an index. Various illustrations accompany the text, though they are not as comprehensive as they possibly could have been.

It is the overriding goal of the author to highlight some of the technological developments in the production and resulting spread of the use of glass in China. She argues that this progress was made possible by means of commercial and diplomatic interactions between the Middle Kingdom and the West, the latter represented first and foremost by the glassmakers from the Venetian Island of Murano and the Pope in Rome. It provided the Chinese not only, on a practical level, with novel mirrors, lenses and window panes and the related know-how for their production, but also, on more artistic grounds, with Aventurine glass and enamel materials, soon to be adapted to their own proclivities, as for example in the decoration of traditionally manufactured Chinese porcelain. 2 This particular earthenware, on

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2 For Chinese porcelain and its glazes featured prominently in Curtis’ book, see the highly informative volume of the Needham series: Rose Kerr and Nigel Wood,
the other hand, had reached Europe by way of the Middle East from the fifteenth century, where the artisans in Murano, unable to produce it by themselves, started to imitate the popular items using glass. In a way, this constitutes some kind of mutual technological stimulation, though realized in different crafts, but this remark also leads me on to a more general objection regarding this treatise: Its title in the first instance suggests a perceptible and bilateral glass exchange between both sides not only in the field of diplomacy, but also in those of trade and production. However, in her volume Curtis only touches on glass as a commercial commodity exclusively shipped eastwards, and uses arguments that may be contestable. What is more, with regard to glass-related technologies, it turns out that, rather than representing an effective exchange, what is at issue here in fact is an example for a rather uni-directional and asymmetric transfer of useful and reliable knowledge, this time from Europe to China. This was primarily mediated by the Jesuits, as we can observe it also in some sectors of mining and hydromethods of various forms. 3

Curtis begins with an overview of the beginnings of glassmaking—corresponding commercial activities on a larger scale in Venice can be traced back to the tenth century, whereas in China, despite its great tradition of glazing pottery and porcelain, the craft remained at a low level until about 1500, partially due to the lack of official patronage at that time. She then develops a wide variety of topics related to her subject-matter in the main part of her work, beginning each of the ten chapters with a short introductory, background sub-section. She starts out with a description of the first contacts of Chinese scholar-officials with Jesuit missionaries: After the Ming dynasty had started to tentatively open up towards the outside world at the end of the sixteenth century, Alessandro Valignano, Matteo Ricci and their successors pursued a strategy of cultural adaptation in order to get into closer contact with these important intermediaries with the court in Beijing. Thus, they presented themselves ostensibly as erudite interlocutors and scientists, from time to time using the demonstration of technical instruments they had brought as additional bait. These instruments included prisms and optical lenses, and it was probably a treatise published in 1623 by Giulio Aleni (Ai Rulüe. 艾儒略; 1582-1649) that contained the first Chinese textual reference to Murano’s glassmaking activities.

In this context some more specific criticisms are necessary. Regrettably, though listing most of them in the glossary, Curtis doesn’t complement the cited Chinese terms, proper names or book titles in the main text with the

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3 This topic is at the center of a current research project of the premodern Section of Sinology, Department of Chinese and Korean Studies, Tübingen University, initiated by Prof. Dr. Hans Ulrich Vogel.
corresponding characters. What is really off-putting, however, are the frequent misspellings, grammatical errors, and even factual inaccuracies in her work. For instance, in chapter two she clearly confuses Ferdinand Verbiest’s Kunyu tushuo (Illustrated Explanation of the Entire World) of 1672 with the actually correct source for the just-mentioned very first account of the Venetian glass production, i.e. Aleni’s Zhifang waiji (Areas outside the Concern of the Imperial Geographer; 1623). In addition, it does not really facilitate the reader’s understanding that the author, at least in this volume, has the habit of repeatedly jumping back and forth between different, at first sight often non-correlated settings. So, from Aleni she turns to some fourteenth-century decrees by the judicial authorities of Venice indicating the Muranese production of, i.a., lenses used in surveying instruments necessary for the drawing of geographical maps. Only after shifting back to the declining Ming dynasty and from there to the dispatch of an official delegation of a Jesuit and a Chinese to Venice a few pages later does it gradually becomes clear that Curtis by this meandering intends to further illustrate the above mentioned specific use of glass lenses in arousing the interest of the Chinese for Western arts and sciences. This of course is meaningful information, which, however, could have been presented in a more coherent way.

Yet, aside from such structural shortcomings and methodological weaknesses, the volume to some extent has the potential to be a treasure trove for particulars with regard to glass: the development of new technologies for its processing, notably in Europe, culture-specific preferences for forms, colours and functions in East and West, the special status elaborate objects enjoyed, and above all the distinct approach of the Qing court to this amorphous solid with its amazing touch of luxury. However, these titbits reveal themselves fully and on a larger scale only if one reads the text with keen attention, and—at least as a non-specialist of glass and enamel workmanship—if one is willing to make oneself familiar with the related vocabulary and some of the technical contexts on one’s own.

Chapters three and four of Glass Exchange centre on technological innovations introduced by the Jesuits and on glass items imported to China via the Portuguese colonial trading post in Macao from the seventeenth century: Venetian mirrors backed with a thin tin-mercury layer and thus of a quality

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[4] The Kunyu tushuo in some respects is based on Aleni’s earlier work, but includes additional information that supplements the Zhifang waiji. The latter was composed as a written comment to Matteo Ricci’s famous World Map, the Kunyu wanguo quantu 坤輿萬國全圖 of 1602, and was started by Diego de Pantoja and Sabatino de Ursis, cf. Goodrich, L. Carrington and Fang Zhaoying, Dictionary of Ming Biography, 1368-1644, New York: Columbia University Press, 1976, p. 4f. This might be the reason for the appearance of de Ursis and his work Taixi shuifa (Hydromethods of the Great West; 1612) in the glossary, even though he is not explicitly mentioned in Glass Exchange at all.
and size hitherto unknown in the Middle Kingdom, telescopes, or spectacles (in use there so far only as monoculars with heavy lenses made from polished rock crystal). All were described with appreciation in the writings and poems of Chinese scholars, who according to Curtis, at the same time often obscured the real origin of these novelties. In addition, with the technical support of Joachim Bouvet SJ (Bai Jin 白晋; 1656-1730),\(^5\) western style window panes started to be manufactured in a new imperial factory in Guangzhou from 1699 onwards, but in parallel had to be imported from Europe well into the nineteenth century, as domestic production was not able to meet the rapidly growing demand of the Chinese elites for glass windows.

In the following chapter we learn that another important route for the transfer of precious and sophisticated glass objects was by way of gifts brought along by diplomatic envoys, and which, for various reasons, were recurrently exchanged between both sides at that time. To illustrate this, the author first focuses on a failed papal delegation to the Kangxi Emperor (r. 1661-1722) in connection with the Chinese Rites Controversy in 1705. After a relatively long-winded description of the political and religious background, as well as the deteriorating course of events of this delegation led by Charles-Thomas Maillard de Tournon (1668-1710), the story at last arrives at its nub, the high esteem of the Beijing court for the Pope’s ‘tribute’-gifts, especially for some small enamel snuff boxes. Yet, “[...] in addition to such imported examples, Kangxi had access to similar styled ones from his [own] glassworks” (p. 60f.) and, according to Curtis, in the same year was already bestowing these and similar luxurious items on high-ranking officials himself, e.g. vases made of “blue glass speckled with gold” (p. 61) reminiscent of Lapis Lazuli. This implies that at least the manufacturing of such artistic glassware had reached a high level in China at that time. Regrettably this information is not further scrutinized or put into perspective in this passage, where the author—as elsewhere— time and again cites direct quotations (for example part of the contents of a papal decree on page 58) from the secondary literature without giving any reference to the related primary sources, thereby reinforcing the overall impression of a non-transparent approach.\(^6\)

\(^5\)Interestingly, the European sponsors and protagonists in this enterprise were not Italian but French, as, in an act of pre-modern know-how theft, the Paris government had hired experienced glass makers from Murano in order to acquire their more sophisticated skills, a development Curtis compares to the later Chinese approach in that field (p. 42f.).

\(^6\) In a similar way, with regard to the manufacturing of glass in China, in her introduction on p. 7 Curtis already talks about “the textual evidence contained in several early works,” but fails to cite a single one of them. She continues with Sun Tingquan’s 孫庭鉉 Yanshan zaji 顏山雜記 (Mt Yanshan Records) without providing the relevant dates and only refers to a treatise on it by Yang Boda instead, making crosschecking a difficult task.
Only in chapter six does Curtis turn to the preceding developments: In 1684 the Kangxi Emperor, keen to promote the sciences in his realm, had asked Ludwig XIV—himself about to extiend his political and commercial interests in that region—to send some skilled supporters for his endeavour to China. The result was the dispatch of six selected French missionary-scientists, among them the already mentioned Joachim Bouvet as well as Louis Le Comte (Li Ming 李明; 1655-1728), who soon after would start to specialize in glassmaking as well. In addition, Kangxi in 1696 had established an imperial glass workshop in Beijing, directed by the German Jesuit Kilian Stumpf (Ji Li'an 纪理安; 1655-1720), and placed it under the supervision of his fifth son Yinzhi 延祺 (1672-1735), who moreover had his own glass foundry installed in his private residence outside the Forbidden City. There, and under the guidance of Stumpf, who prior to departure for his pastoral work in Asia had learnt the secrets of this craft in Germany, the Chinese glass artisans tried to gradually emancipate themselves from their Jesuit supporters, and to develop sophisticated technologies adapted to local means and possibilities. Yinzhi seems to have spared no effort in these experiments, attempting to produce “pieces as beautiful as our Aventurine,” as the French Jesuit Antoine Gaubil (Song Junrong 宋君荣; 1689-1759) noted more than thirty years later in one of his letters. Still, the questions of whether, how and when he in fact succeeded in doing so is neither posed nor answered here, though the basis for new and indigenous production processes obviously was provided this way.

The state of the art regarding early eighteenth-century Muranese glasswork itself is displayed in the next section, where Curtis inserts into her own work a tripartite, detailed list of precious cristalli di Venezia to be presented

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7 As is often the case in western literature, Curtis here erroneously has Yin티 instead of Yinzhi, cf. Gimm, Martin (2016), “Henkama, ‘Väterchen Heng,’” Monumenta Serica, 64:1, 101-136, here FN 120, p. 115f. Moreover, in the glossary she gives wrong characters for two of Yinzhi’s younger brothers: The 3rd Prince, Yinzhi, is 延祉, whereas the 15th Prince reads Yinwu, not Yinyou 延有. Yinzhi 延祉 actually was the first son of Kangxi surviving into adulthood. However, as the son of an imperial consort he was not eligible to be heir apparent.

8 The glittering Aventurine glass (also called “goldstone”) had been invented in Murano by chance (in Italian: a ventura) some time after 1611. Its challenging production process soon was protected by an exclusive license granted by the Venetian authorities. According to Curtis, who provides some interesting information in this regard, the experienced glazier Pierre D’Incarville SJ who arrived in China in 1740 initially had great difficulty to produce it employing the means available in the imperial glass workshop.

9 As pointed out by the author, this list, based on an unpublished document from the Archivio de Propaganda Fide in Rome, was compiled by Paolo Zecchin. It is followed by short explanations by the same author for some of the Italian termini tecnici used in his list.
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to the Kangxi Emperor in 1720 by a further papal delegation, led by Carlo Ambrogio Mezzabarba (1685-1741). After the unfortunate outcome of the 1705 delegation, this time everything was prepared by the Vatican with great care, including the various gifts selected on the suggestion of missionaries stationed in China. At least this part of the whole endeavour resulted in success, as the ‘tribute’ was accepted by the Emperor, who on his part, took the opportunity to respond to this outright display of Venetian artistry with a reciprocal gift of 132 pieces of Pekinensi vitro from his own glass workshop, thus demonstrating the achievements in the craft under his personal patronage. The account here offers interesting insights not only into diplomatic practices, but also into the then prevalent tastes in art and the predilection for exquisite vitreous objects. Yet, instead of loosely appending just a few random pictures at this point, some illustrations directly related to the theme would have helped to further enhance the reader’s experience. Indeed, this passage indicates a certain kind of limited bidirectional glass transfer, even though the Chinese artefacts never reached their intended destination, and so again unfortunately their particular composition and the actual quality of the wares remains obscure.

The very short chapter eight deals with the already mentioned first European efforts to imitate Chinese porcelain, an expensive luxury item called “white gold.” Its production became technically feasible only from the beginning of the eighteenth century, with the city of Meissen in Saxony taking the lead in that field, whereas – interestingly enough – it took the artisans in Venice several decades more to refine the essential formula and finally achieve the quality of the Chinese ware. From the European setting Curtis turns back east in the following chapter, namely, to the export of enamel colours and related processing methods to China during the first half of the eighteenth century. This has been a controversial topic among experts to date. Her own hypothesis, introduced on p. 107, is expressed rather cautiously but roughly reads as follows: In China the transfer and subsequent adaptation of a genuinely European glass-related technology in the end led to the development of a fundamentally new artistic tradition in indigenous porcelain decoration, and, more generally, the role of glass in this context has been underestimated up to now. She no doubt has a point and this certainly is a fascinating issue, but regrettably the analysis that follows not only contains quite a few patchily explained and sometimes ambiguously used technical terms, but the author’s overall line of argument is also difficult to

10 The fragile freight was lost on Mezzabarba’s way home, when his ship was completely destroyed by fire in the port of Rio de Janeiro in June 1722 (p. 93).
11 For example, the first sub-section of chapter 9 after the introductory remarks is titled “Enamel Material (cui),” suggesting that the text below is more or less about something like the basic ingredients used for this technique, and that cui would be a Chinese generic term relating exactly to that. However, reading on and consulting
follow, at least for someone who is not an expert in this field. It should suffice here to highlight the once again important role of the Jesuits in that transfer, and the particular Chinese division of labour in the production of enamels: As this required special expertise exclusively available in the imperial glass workshop in Beijing, after being manufactured in Jingdezhen the porcelain ware was shipped to the capital, where the quality of this base material was inspected at court, in certain cases even by the Emperor himself. Only then was it handed over to a special workshop to be painted with the enamel colours provided by a third group of artisans, the Emperor’s glass specialists, and subsequently fired once more.

Finally, Curtis seems to become aware that—besides the general remarks on the import of European window panes to China—her volume still lacks some more specific comments on the role of glass as a commodity, and so in the final chapter she abruptly turns to one—though not really convincing—example: In England, with the support of French and Italian artisans and under official patronage flanked by protectionist measures, a respectable glass industry had developed from the sixteenth century. At the end of this century its products, especially the newly invented lead crystal, began to displace those from Venice on the export markets, while in parallel the British East India Company eventually succeeded in establishing trade relations with Qing China. As large quantities of glass ingots in different colours, potentially usable as raw material for reprocessing by Chinese craftsmen, later were found in the wreck of one of the company’s China-bound vessels, Curtis speculates that “the exportation of such glass materials seems to have been an ongoing affair […]” with Chinese officials illicitly engaging in the related flourishing commercial activities. She concludes that this would allow for an “insight into the commercial background to the interactions between European and Chinese enamel and glass industries in the seventeenth and eighteenth centuries” (p. 128). Yet, she omits that the mentioned ingots were rather pale in colour and therefore not suitable for enamelling, and that, as stated by Redknap and Freestone, their possible processing in the production of glass vessels is difficult to prove because in China a “compositionally similar type had been in use since the Song dynasty.”

In the end Curtis draws the conclusion that the “effectiveness of the ‘open-door’ policy of the Qing” in China had made possible a “renewed creativity among artisans” (p. 132), who combined the imported glass techniques with their own traditional methods, leading not only to the creation of artful objects with a particular Chinese flavour, but also to technical mastery at least on a par with their European counterparts. Naturally, she states, the unusual and expensive gifts brought along by the Macartney mission in 1793, among them a great burning lens, failed to excite the admiration of the Chinese court that had been permanently exposed to the latest scientific devices via the missionaries at that time. The author at this point limits herself to the remark that the reigning Qianlong Emperor (r. 1736-1795), in sharp contrast to his grandfather, the Kangxi Emperor, and the admiration that Curtis extracts from the writings of some of his scholar-officials, showed no interest in the practical application of these skills. This, however, rather leaves the impression of a dead-end affair than that of a fruitful ‘exchange,’ and thus here, finally, the question arises as to whether the author hasn’t opted to make her observations through rather rose-coloured glasses time and again. When and why would the initial “wonder and desire” of the Chinese political elite for such glass making start to be replaced by a more introverted attitude, and a kind of officially imposed technophobia, finally resulting in the overall stagnating tendencies of the Qianlong period that are traceable in many other domains as well? Why was the enormous potential of expert knowledge transferred by the Jesuits not utilized to a greater extent, but channelled first and foremost into the creation of artistic objects, while remaining dependent on foreign imports for daily necessities like window panes well into the 19th century? Needless to say that from a broader perspective this amazing topic could well have served as a prime example in the controversial discussion surrounding the developments leading to the ‘Great Divergence.’

To sum up, Glass Exchange between Europe and China, 1550-1800 by Emily Byrne Curtis due to its manifold methodical and structural shortcomings in a narrow sense cannot be regarded a full-fledged scientific treatise on the subject matter. Full of inadequately explained technical terms and contexts it seems to be addressed more to an expert readership than to someone interested in premodern encounters between China and the West or the comparative history of early globalization in general. Nevertheless, if one is willing
to ignore these frequent inconveniences, search for the missing information on one’s own, and read between the lines, the volume in the end has the potential to turn into an inspiration for further research in this interesting field.