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Glass along the Silk Road in the first millennium AD[1]

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The so-called Silk Road routes of the 1st millennium AD promoted the spread of ideas and artistic trends, advanced technology, arms, horse harness etc. Glass had played an important role in the exchange network between the West and the East as well as South and North ever since antiquity. Most of the archaeological glass (vessels, personal ornaments) from the Eastern end of the Silk Road (China, Korea) comes from 'special' places, such as elite burials and Buddhist temples. Their importance for ancient Chinese and Korean societies, where precious stones, bronzes and porcelains played a significant role, remains an open issue. The origin of glass artifacts found along the Silk Road, particularly in China and Korea, is still debatable. Transparent glass vessels unearthed in China are rare, usually interpreted as Western imports, proving trade relations along the so-called Silk Roads. Most of them come from elite graves, while others were deposited in temple treasuries, like the famous treasure from Famen Si (Shaanxi province). In both instances, the suggestion is that objects of this kind were valuable and highly appreciated, thus probably quite rare in China. The latest studies, especially laboratory analyses, have thrown new light on the origin of the glass finds from China, raising at the same time multiple issues concerning their cultural and social context. The aim of the present paper is to analyse the chronological and geographical distribution of Western-related glass vessels within the present territory of the Peoples Republic of China, as well as Korea and Japan, and to discuss social interactions and processes which caused these goods to reach Chinese territory and beyond. The final goal is to understand the reception of these exotic goods by the local population in terms of their meaning and value.

KEY–WORDS**:** Silk Road, glass, imports, cultural exchange

Research on the Silk Road inevitably opens multiple questions concerning traded goods, their nature and value. Glass vessels are usually considered as Western products exported from the Mediterranean region and valued in distant countries, even in China. This paper presents observations on glasses from the West found in archaeological contexts in Eastern Asia: China, Korea and Japan, and their possible interpretation.

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Early research on the contacts between Western and Eastern Asia hypothesised that glass was among the most important goods exported to the East because the technology of producing multicoloured, transparent glass was unknown in China. This was based initially on the reading of ancient Chinese texts where glass is mentioned as one of the 'Roman products' (Hirth 1975: 230–234) and on the fact that most ancient Chinese glasses produced locally were of an opaque, usually greenish glass with high lead content (Pb and Pb–Ba glass systems). In default of persuasive evidence of local production of transparent glass, this hypothesis seemed plausible, especially in the light of the modest presence of objects of western provenience found in Xinjiang by Aurel Stein at the beginning of the 20th century. These finds were the essential proof of glass being imported from the West to China via the so-called Silk Road, leading from the Eastern Mediterranean through Mesopotamia, Iran, Central Asia and the Tarim basin, as proposed by Ferdinand von Richthofen in his famous work entitled *China, Ergebnisse eigener Reisen und darauf gegründeter Studien* (Richthofen 1877: 499–500).

Years of excavations in China and scientific laboratory analyses of glass objects from archaeological contexts have changed this picture dramatically. It is currently assumed that starting from the beginning of the 1st millennium AD glass vessels were imported to the Far East from different regions of Western and Central Asia along different maritime and land routes. Perhaps the most spectacular proof of long distance trade are the Persian glass vessels which became part of the Shōsō-in[正倉院], the treasury of the Tōdai-ji [東大寺] temple in Nara city [奈良市] in the 8th century AD and which reached Japan from Iran through China. At the same time, however, transparent glass was being produced locally in some regions of China, although the technology did not spread to other areas and appears to have been abandoned in the end. Long exposure to imported objects and probably also to foreign craftsmen prompted a development of local technologies and the emergence of various types of locally produced glass in the second half of the 1st millennium AD. Moreover, the scarcity of imported glass finds from the 1st millennium AD speaks out against a regular trade, indicating rather that these items were individual imports, rare and precious objects, explaining why the only archaeological contexts in which they are found are aristocratic graves and temple treasuries.

GLASS FINDS FROM CHINA

Han dynasty period

Recent research on a small group of glass objects from Han dynasty graves in the Guangxi Zhuang Autonomous Region [廣西壯族自治區] has shown that contrary to the earlier hypotheses the technology of producing transparent and semitransparent glass may have been known in China as early as at the end of the 1st millennium BC.

Several vessels, mainly bowls and cups, were found in tombs in Hepu [合浦] county and Guigang municipality [貴港][2] (Huang 1988, 1991, 2006; Guangxi 2006; Xiong and Li 2011) (Fig. 1). They find parallels among unprovenanced objects of similar shape and size, including two pieces from the Musée Guimet and one cup from the private collection of W.H. Shorenstein in San Francisco, the latter having undergone chemical analyses (Brill 1995: 271–274; Borell 2010: 131). At first glance these forms are quite like the Hellenistic moulded bowls produced in the Eastern Mediterranean, but their chemical composition differs remarkably from Western glass. While the Mediterranean glass was made of so-called soda–lime glass with high Na_2O content (usually between 10% and 20%) and a fairly high percentage of CaO, the Guangxi glass contained K_2O instead of Na_2O and is characterized usually by CaO below 1% and moderate Al_2O_3 (above 3%) (Xiong and Li 2011: 71–98) Although potash glass was found in multiple areas extending from Central Asia through South and Southeast Asia up to Korea and Japan, some local variations in the CaO and Al_2O_3 percentages can be observed (Dussubieux and Gratuze 2013: 404–406). Lankton and Dussubieux (2006: 135–136) distinguished three categories of potash glass: the most popular moderate CaO and Al_2O_3, low Al_2O_3 (most samples of such glass come from the late 1st millennium BC sites in Southeast Asia, mainly from Ban Don Ta Phet in Thailand as well as from Sa Huinh culture sites in south and central Vietnam and Lang Vac, the southernmost site of Dong Son culture in northern Vietnam) and low CaO (most of the samples come from Dong Son sites in northern Vietnam, China, Korea and Japan). The Guangxi finds naturally fall within the last group.

The origin of this type of glass is still not definitely proved. To date, there are no workshop sites producing such glass known from the area of Eastern or Southeast Asia. Lankton and Dussubieux suggested the production of raw material for low CaO potash glass in Southeast Asia or China (Lankton and Dussubieux 2006: 136). Huang (1991) proposed that at least some of these vessels could have been produced locally (Huang 1991: 192), while Borell argued that vessels found in Guangxi had to be produced locally and were even exported as far as the Indian Subcontinent (Borell 2010: 134–138). The most recent study by Xiong and Li (2011), which includes a comparison of the chemical composition of samples from China, India and Southeast Asia, as well as additional research on the Rb/Sr ratio, seem to prove the local origin of Guangxi glass. A lead isotope analysis demonstrated parallels in the typically local production of Pb and Pb–Ba Chinese glasses (Xiong and Li 2011: 158).

The issue of glass from Guangxi opens multiple questions that extend beyond the scope of this paper, such as the cultural association of vessel forms which hardly find

2 Guigang [貴港] is now a prefecture-level city. Before 1988 it was known as Gui county (貴縣 Guixian), thus objects found and published in earlier publications may be described as found in Gui county.

parallels in the local production, the location of workshop centres and distribution patterns. However, one thing is clear: the technology of transparent glass production was known in southern China already in the 1st century BC.

In this context the issue of glass vessel imports from the West and their value on the Chinese market takes on added interest. Glass vessels of Western origin found in Han dynasty contexts in China are particularly rare. To date, only three examples are known. Small fragments of a moulded ribbed bowl made of purple and white mosaic glass were found in tomb no. 2 from AD 67, located at Ganquan [甘泉], Hanjiang [邗江] county, Jiangsu [江蘇] province (Nanjing Bowuyuan 1981: 1–10). A fragmentary green cup with convex bottom comes from the tomb at Laohudun [老虎墩] in the same area, dated roughly to the Han dynasty (Changzhou Bowuguan 1991: 62–70), while a green and white mosaic glass bottle was found in a tomb at Luoyang [洛陽] from the 3rd century AD (Watt *et al.* 2004: 113).

The ribbed bowl is a typical example of late Hellenistic – early Roman Eastern Mediterranean production and is represented in many regions of the Roman Empire; multiple parallels of Eastern Mediterranean origin populate museum collections around the world (Matheson 1980: 14; Auth 1976: 50; *Ancient Glass* 2013: 370; 373). Chemical analysis have identified the cup from Laohudun as made of soda–lime glass probably in the same region (Changzhou Bowuguan 1991: 70). And the mosaic glass bottle from Luoyang is a typical example of a Roman *unguentarium*, which was also often produced in the Eastern Mediterranean.

The extremely rare occurrence of glass finds from the early centuries of the 1st millennium AD in central and eastern China is significant in this context. Taking into consideration the scope of archaeological research all over China, this scarcity is not due to the casual nature of such finds, but reflects the actual scale of imports from the Western countries. During the Han dynasty reign, contacts between the extremes of eastern and western Asia were usually indirect and items from the more distant countries were obviously rare in China. They must have been perceived as exotic curiosities and included in the funerary inventories of the highest aristocracy as rare and valuable goods.

Finds from Xinjiang dated to the period of Han–Jin dynasties

A few finds from the area of Xinjiang Uyghur Autonomous Region [新疆維吾爾自治區] could probably be added to the above group, although the chronology in their case is not definitely clear, since they were found in cemeteries that are dated generally to the period between the 1st and 5th century AD.

Let us first mention cups with cut decoration found on two sites in the south-eastern part of Xinjiang. Two small flat-bottomed cups with slightly opening out walls were found in the Yingpan [營盤] necropolis, Yuli [尉犁] county, one by Stein (Stein 1928, vol. II: 756, vol. III: plate CX), the other during Chinese excavations conducted in 1995 (Xinjiang Wenwu Kaogu Yanjiusuo 2002: 41; Li W. 2007: 139–140, Fig. 1) (Fig. 2). A third vessel of similar shape was found in Zagunluk [扎滾鲁克], Qiemo

Fig. 1. Glass cup from Tomb no. 1 at Huangnigang, Hepu county, Guangxi province (after Wu and Lü 2006: Colour Fig. 8)

Fig. 2. Glass cup with cut decoration from Yingpan necropolis, Yuli county (after Xinjiang 2002: Fig. 59)

[且末] county (Wang and Lu 2007: 127, Fig. 1). The tentatively late date of these vessels and their decoration, similar to Sassanid glass production, led them to be considered as Iranian imports. Recent physico-chemical analyses have demonstrated, however, that the cup from Zagunluq is made of soda–lime glass with a very small content of K_2O and MgO (less than 2%), which is a typical composition for Eastern Mediterranean glass (Cheng *et al.* 2011: 89–91). Two other finds are similar in shape and decoration, but differ in details. It seems thus that all three cups could be considered as produced in the Roman Empire, but further analyses are needed.

A small piece of glass vessel with two grooved lines under the mouth and traces of cut facets on the walls was found during excavations conducted at the Loulan [樓蘭] site in the eastern part of Xinjiang. Again, the dating of this object is broad: 1st–4th century AD (Yu 2010: 191). No results of physico-chemical analyses have been published to date, but it seems that it could be a fragment of a Roman cup or beaker with faceted decoration. A similar vessel was found at Nijmegen in Holland (Olivier 1984: 35–58), but other examples with the rim divided into two parts by a horizontal line and decoration of oval facets cut on the lower part of the vessel, dated to the 2nd–3rd century AD, have been found at other sites, such as Dura-Europos for example (Clairmont 1963: 68–71).

Recent laboratory analyses of the chemical composition of a small group of glass shards collected by early researchers, principally Aurel Stein and Sven Hedin, at diverse sites in Xinjiang, have shown that most of these glass vessels were of Central Asiatic origin, while Western Asian objects were definitely rare (Brill 2009: 109–148).

The states of the so-called Western Regions were only intermittently subjected to Chinese control and some of them enjoyed relative independence. Here crossed communication routes from all directions and it was only natural that objects from diverse regions flowed in and out of this region. Even so, glass vessels of Western provenance dated to the Han and Jin dynasties were relatively rare, suggesting that they were highly valued objects of a luxurious nature.

Six dynasties

The situation started to change in the 3rd–4th century AD. The fall of the Han dynasty at the beginning of the 3rd century AD began a long period of political destabilisation and disintegration of Chinese territory into smaller states, often governed by dynasties of non-Chinese origin. By paradox this period opened a new chapter in the development of Chinese culture, influenced by foreign ideas and cultural patterns on a large scale. One of the most important factors stimulating the process was the development of Buddhism in China and, in consequence, pilgrim movement and the mobility of monks, transmitting not only religious ideas but also knowledge about distant countries, their people, art and crafts. Moreover, foreign goods were often carried as gifts for the temples (Lewis 2009: 157–162). After the fall of the Han dynasty

the rules regulating trade with the non-Chinese became less strict and gradually more and more foreigners travelled to China and even settled in cities like Dunhuang [燉煌] in Gansu [甘肅] province and further east, up to the Central Plains. Letters written in the early years of the 4th century AD by the members of the Sogdian community of merchants settled in China, discovered by Aurel Stein in the ruins of an ancient beacon tower, 55 km west of Dunhuang [燉煌], give precious evidence of the everyday tribulations and business troubles of the foreign traders (de la Vaissière 2002: 48–65; 2004: 19–23). The development of trade and pilgrim mobility both resulted in a growing number of imported objects being accessible on the market, increasing the awareness of their existence and origin at least among the higher classes of society.

One of the most spectacular discoveries of Western glass vessels in China was made in the family tomb of Wang Li (tomb no. 70) at Xiangshan [象山], close to Nanjing [南京] city in Jiangsu [江蘇] province. The tomb, which is dated to AD 322, yielded two beautiful Roman cups with cut decoration, reflecting the high skills of the craftsmen and their unquestionable artistic value. One of these glasses, almost intact, was placed in front of the coffin of the male deceased, the other, very fragmented, in front of that of his consort (Nanjing Shi Bowuguan 1972). The preserved vessel is 10.4 cm high, has thick walls and a deep-cut decoration consisting of horizontal lines, a row of small vertical ovals in the upper part and a row of big, vertical oval facets covering the lower part of the body. It was made of transparent yellow soda–lime glass (Gan 2009: 93, Table 2.8), undoubtedly in one of the workshops located in the Roman Empire (Fig. 3).

A few other glass vessels made of soda–lime glass, probably imported from the Eastern Mediterranean, were found in Nanjing, which was the capital of the Jin dynasty [晉朝 AD 265–420] between AD 317 and 420 and then of the succeeding Southern dynasties [南朝 AD 420–589]. These include small fragments of the upper part of a translucent, colourless bowl with two horizontal lines below the rim and diagonally organized cut petals (Nanjing Daxue 1973: 36–50) and fragments of a transparent yellow vessel with traces of cut decoration excavated in the northern suburbs of Nanjing (Nanjing Shi Bowuguan 1983: 315–321). These finds come from aristocratic tombs and are proof of a high concentration of luxurious goods in one of the political centres of China in this period.

Definitely in this period glass imported from the closer area of the Sasanian Empire was more common. Vessels of this kind were found also in the area of Nanjing as well as in other areas of China. We could mention here a transparent, light green bowl with slightly narrowing neck, decoration of a row of knobs in the middle of the body and small knobs on the bottom. This vessel was found in 1965 during excavation at the Hua Fang [華芳] tomb in Beijing [北京], which is dated to the reign of the Western Jin dynasty [西晉朝 AD 265–316] (An 1986: 173–174) (Fig. 4). It was made of plant ash glass (Na_2O–CaO glass, K_2O and MgO >2%) (Gan 2009: 93, Table 2.8).

Fig. 3. Glass cup with cut decoration from the Wang Li tomb at Xiangshan, Nanjing, Jiangsu province (courtesy of The Oriental Metropolitan Museum at Nanjing). Photo by M. Żuchowska

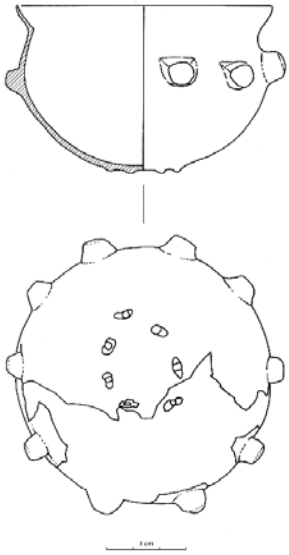

Fig. 4. Glass bowl from the tomb of Hua Fang in Beijing. (after An 1986: Fig 2). Drawing by J. Ożóg

A group of five transparent glass vessels was found in the tomb of Feng Sufu [馮素弗], younger brother of Feng Ba [馮跋], known as the emperor Wencheng [文成] of the Northern Yan dynasty [北燕朝], discovered in Beipiao [北票], Liaoning [遼寧] province, dated to AD 415. There was an intact shallow bowl with inward-folded rim and ring foot, a fragment of the foot of a cup, a bowl with convex bottom, a duck-shaped *unguentarium* and a cup with open mouth and concave bottom. The latter was made of deep green transparent glass, the others of transparent greenish glass (Li Y. 1973: 6–7). The shallow bowl was made of a plant-ash type of glass, but with a high content of K2O, over 4% suggesting its Central Asian origin (Gan 2009: 93, Table 2.8; Brill 2009: 122) (Fig. 5). The duck-shaped *unguentarium,* however, fails to have close

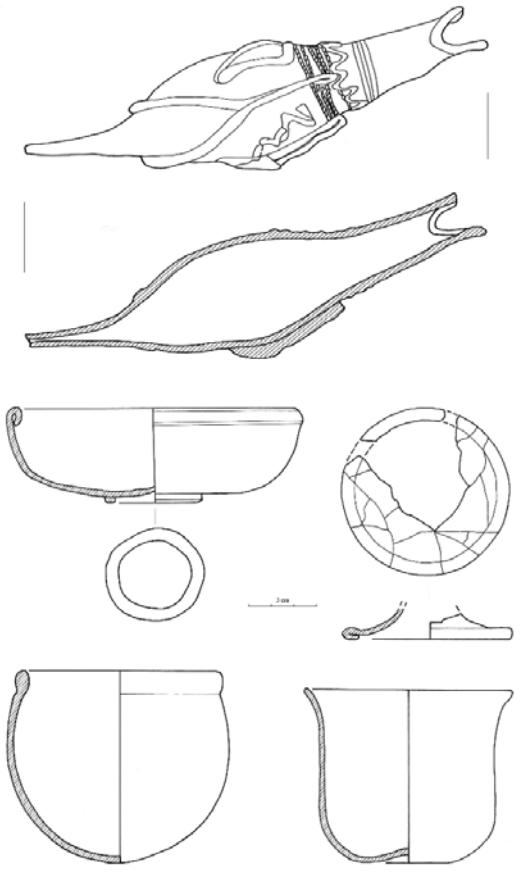

Fig. 5. Glass vessels from the Tomb of Feng Sufu at Beipiao, Liaoning province (after Li 1973: Fig. 9, 10). Drawing by J. Ożóg

parallels in glass from this area. Result of chemical composition analyses of the other vessels could answer the question whether all the vessels from this group came from one source or were they perhaps collected over a longer period of time and ended up in a single funerary deposit by chance.

Sasanian cut glass with faceted decoration and, less commonly, relief cut decoration became quite popular about the 5th century. One of the best preserved examples is a colourless bowl with cut decoration in the form of vertical petals on the body and seven large round facets on the bottom, found in tomb no. 107 in a necropolis in the southern suburbs of Datong [大同], Shanxi [山西] province, dated to the reign of the Northern Wei dynasty [北魏朝 386–535] (Shanxi Sheng 1992: 10) (Fig. 6). Another interesting example is a bowl made of green glass with cut decoration of convex circular elements, found in the tomb of Li Xian [李賢] in Guyuan [固原], Ningxia Hui Autonomous Region [寧夏回族自治區], dated to the Northern Zhou dynasty [北周朝 AD 557–581] (Ningxia 1985: 14) (Fig. 7).

Before the unification of Chinese territory by the Sui dynasty [隋朝 AD 581–618], western glass was imported in larger numbers than under the Han dynasty, but still remained a rare and luxurious type of goods. Although in the southern provinces the production of transparent glass based on silica was known, it did not spread to other regions of China and most people believed that glass was a natural raw material, similar to crystal. In his famous text *Bao Puzi* [抱樸子 *The Master who embraces simplicity*], in the chapter Lun Xian [論仙 *About Immortals*], Ge Hong [葛洪], a Daoist writer born at the end of the 3rd century AD, writes of popular beliefs concerning glass production in China during his lifetime:

外國作水精碗，實是合五種灰以作之。今交廣多有得其法而鑄作之者。今以此語俗人，俗人殊不肯信。乃云水精本自然之物，玉石之類。

In foreign countries water essence[3] *bowls are produced, which in reality are made by mixing five types of powdered components. Nowadays there are many [of those] who possess this method and produce them* [bowls] *in Jiao and Guang*[4]*. Now, if we talk about the simple people, they are not willing to believe it. They say that the water essence is natural, like jade* (Ge Hong, *Bao Puzi 2, Lun Xian.* Transl. M. Żuchowska).

The demand for glass vessels was relatively high due to their unique features and luxurious character. In the *Beishi* [北史 *History of the Northern Dynasties*] we can read about people from Dayuezhi [大月氏, probably Bactria], who came to trade in the capital city of Pingcheng [平城], modern Datong [大同] in Shanxi [山西] province:

[3] *Shuijing* [水精] means literally 'water essence'. It is sometimes mistakenly translated as 'crystal', which is also pronounced *shuijing,* but written with another character [水晶]. It seems that it could be interpreted as 'transparent glass'.

[4] *Jiao and Guang* [交廣] correspond to the ancient Jiaozhi [交趾] Prefecture covering the northern part of Vietnam and Guang [廣] Province covering the area of present-day Guangdong [廣東] and Guangxi [廣西] provinces (Vu 2007).

Fig. 6. Sasanian bowl with cut decoration found in a tomb in the southern suburbs of Datong, Shanxi province (after Shanxi Sheng 1992: Plate 1)

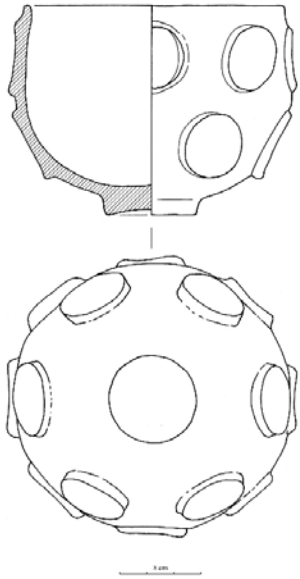

Fig. 7. Sasanian bowl with cut decoration from the Li Xian tomb at Guyuan, Ningxia province (after Ningxia 1985: Fig. 26)

太武時，其國人商販京師，自云能鑄石為五色琉璃。於是採礦山中，於京師鑄之，既成，光澤乃美於西方來者。乃詔為行殿，容百餘人，光色映徹，觀者見之，莫不驚駭，以為神明所作。自此，國中琉璃遂賤，人不復珍之。(北史 97， 列传85： 西域)

During the reign of Taiwu[5]*, people from this country* [Dayuezhi or Bactria] *arrived in the capital to peddle. They said they can cast stone to make five-colour glass. They mined* [stones] *in the mountains,* [brought] *them to the capital and cast them, when it was finished it was beautifully shining like this which comes from the West. Thus, on the emperor's order they built a pavilion that could house more than one hundred people. It was translucent and had bright colours. Among those who came to see it, everyone was astonished, they thought it was made by the demons. From that time on, glass became cheap in China and people stopped to treasure it* (*History of the Northern Dynasties* 97(85): *Western Regions.* Transl. M. Żuchowska).

This account must not be interpreted literally, but it reflects the high value of rare imported glass vessels and attests not only to foreign traders, but also apparently glassmakers travelling to China, who could supply the local market by producing glass according to their own technologies, possibly from imported raw materials.

Archaeological evidence of such production, intended for the Chinese market, but using foreign technology, comes with a small vase of an opaque deep blue that was found in tomb no.16 in the Eastern suburbs of Datong, Shanxi province (Datong 2006: 50–71). The chemical composition of this glass is typical of Central Asian production (Central Asian high Al_2O_3 type: Na_2O–CaO–SiO_2 with K_2O>4,5% and Al_2O_3>5%), but the form is analogical to ceramic vessels popular in this region and represented also among the funerary items in the same grave (Datong 2006: 50–71; An 2009: 384; Brill 2009: 122) (Figs 8, 9).

Sui and Tang dynasties

During the reign of the Sui and Tang dynasties [隋朝 AD 581–618; 唐朝 AD 618–907] the demand for glass objects of Western origin did not diminish. Typical examples of early Islamic vessels flowed to China in a wide stream and while the vessels were still precious luxury items, the consumer had changed. Before the Sui dynasty glass vessels were found in elite graves; later, singular examples were also placed in graves, but most of the finds occurred as offerings made to the Buddhist temples and preserved in their treasuries. Optimal storage conditions away from the impact of destructive environmental factors have left these glasses in a perfect state without any trace of oxidation or other kinds of damage. These vessels often constitute the best preserved examples of glass of this period. A similar pattern of glassware finds in tombs and temples can be observed in Korea (cf. Lee 2010) and Japan (cf. Taniichi 2010).

[5] Posthumous name of Tuoba Tao [拓拔燾], emperor of the Northern Wei dynasty [北魏朝, AD 386–535], reigning from AD 408 until 452.

Fig. 8. Small vase from a tomb in the eastern suburbs of Datong, Shanxi province (after Datong 2006: Fig. 26)

Fig. 9. Pottery jar from a tomb in the eastern suburbs of Datong, Shanxi province (Datong 2006: Fig. 42).

In the times of the Sui and Tang dynasties glassware reached China proper in one of two ways. Either by the land trails which were a continuation of the earlier trade routes from the west, unchanged until the rebellion of An Lushan [安祿山], and conducive to Arab expansion into Central Asia or by the maritime routes which gained importance during the turbulent middle years of the 8th century, reaching areas located in Southern China, around present-day Guangzhou [廣州]. Glass production also developed rapidly during this period, introducing soda–lime–silicate glass (also in the form of vessels imitating indigenous pottery models, Gan 2009: 92–94) next to the local types of high lead–silicate and potash–lead–silicate glass developed in the technical experiments of an earlier age (Gan 2009a: 26–30) under the influence of blown glass imported from the West.

The demand for cut Sassanian glass did not diminish during the times of the Sui dynasty. A fine example of a small bottle with relief cut decoration was found in the tomb of She Li [舍利] on the eastern outskirts of Xi'an [西安], Shaanxi [陕西] province (Zheng 1988: 62) (Fig. 10), but the local production also became popular. Locally

Fig. 10. Bottle with cut relief decoration found in the tomb of She Li on the eastern outskirts of Xi'an, Shaanxi province (after Zheng 1988: Plate 2)

produced soda–lime–silica glass vessels have been found in the tomb of Li Jingxun [李靜訓], Xi'an [西安], Shaanxi [陝西] province (Gan 2009: 92).

Glassware was discovered in large numbers in the burials of Tang aristocracy in Shaanxii [陝西] province around the capital city of Chang'an [長安] (present-day Xi'an [西安]) (Wang 2010). In 2010, glass objects were known from 18 graves, allowing Wang to distinguish three chronological phases during the Tang period based on the identified types of vessels and their frequency in the burials (cf. Wang 2010: 167–174 and Table 1). It should be noted that only two of the 18 burials belonged to the middle class and not the aristocracy (Wang 2010: 172, Table 1). 'Early Tang glass' comes from the first phase dated to the 7th century AD. Eight of the elite burials could be assigned to this phase: 1) tomb of Li Shou [李壽] at Sanyuan [三原] county; 2–3) tombs of the princesses Changle [長樂] and Xincheng [新城], attendant tombs at Zhaoling [昭陵] in Liquan [禮泉] county, Xianyang [咸陽] municipality; 4) tomb of Li Shuang [李爽] in Yangtou [羊頭] village; 5) tomb of Wen Chuo [溫綽] at Xi'an [西安]; 6) tomb of Yuan Shijiang [元師奬] at Zhengjiacun [鄭家村], Qishan [岐山], Baoji [寶雞]; 7) tomb of princess Da Chang [大長] at Fangling房陵 in Fuping [富平] county; and 8) tomb of Li Feng [李風] in Fuping [富平] county (Shaanxi Sheng Wenwu 1959: 43, Shaanxi Sheng Bowuguan 1974: 77, Fuping 1977: 321, Wang 2010: 172). Mainly personal ornaments were discovered in these graves: flower beads, strung beads, beads of a trumpet flower shape, and a flower-like fluted bowl (Wang 2010: Figs 8, 9). Similar objects have been found in 7th century tombs located in other areas of China, such as the Guyuan [固原], Ningxia Hui Autonomous Region [宁夏回族自治区]. Chemical analyses show that they were probably made locally as most of them are of lead glass (Ningxia 1996: 61, 236). Unusual thin-walled or spherical beads, approximately 2 cm to 5 cm in diameter are also known from this period from the Shaanxi region. Their function as harness ornaments has been suggested by their presence under a wooden statue of a horse from the tomb of Li Feng (Fuping 1977: 321). Three egg-shaped glass objects were found in the grave of Li Jingxun [李靜訓] from the Sui dynasty, interpreted as 'a kind of toy… rather than the ball-like ornament' (Wang 2010: 173). The glass vessels from the first phase included mainly bottles (Li Shou), bowls (Princess Xincheng, Li Shuang and Wen Chuo) and a goblet (Princess Changle) (Wang 2010: 172, Table 1).

The second phase, referred to as 'Prosperous Tang glass', dated from the late 7th to mid 8th century AD, encompasses eight burials with glass finds. Two of these are middle class interments. Glass as personal adornments was just as usual as in the earlier stage: strung beads and beads for inlays, as well as hairpins, round, oblate, and tubular in form (Wang 2010: Figs 10, 11 and 13). A few items are shaped resembling a flower knot (Wang 2010: 173, Fig. 12). A necklace of glass beads in the form of flowers knots is preserved in the Shōsō-in treasury in Japan (Wang 2010: Fig. 14).

The third phase, 'Middle to Late Tang glass', is dated from the mid 8th to the early 10th century AD and coincided with turbulent times for the Tang empire when the old

trade routes in Central Asia were lost. Two burials with glass are known, one being an emperor's mausoleum yielding two glass disks with images of the dragon and the phoenix, typical Chinese ornamental patterns reserved for the emperor. The other burials were a small or middle-sized tombs and contained two green and yellow discs of glass (Wang 2010: 174, Table 1).

Only a small group of objects from the tombs in the Chang'an area have been analysed, but most of them appear to represent local production. Items of personal adornment have parallels among the Guyuan finds made of lead silicate glass (Ningxia 1996: 236); also a bottle from the Li Shou [李壽] tomb was made of high lead silicate glass, while the bottle from the Li Jingxun [李靜訓] tomb is a typical example of locally produced soda–lime silicate glass (An 1984: 18, Table 2; Gan 2009: 94). The glass that came to southern China under the Sui and Tang dynasties and the successive age of the Five Dynasties and Ten Kingdoms [五代十國, AD 907–960] reached the region through the commercial port of Guangzhou which developed during the Tang Dynasty and played a key role in glass distribution. From the 7th to the 9th century it was the main port of the Tang empire and of the Song dynasty [宋朝, AD 960–1279] from the 10th to the 13th century. Glass was imported primarily from the Arab world (An 2009a and 2010). Fragments of vessels made of soda–lime glass of a chemical composition characteristic of the Arab zone were discovered in archaeological levels at the Nanyue [南越] King's palace (An 2009a: 392, Photo 20.4) and in the Kang Mausoleum [康陵], the tomb of Liu Yan [劉岩], usurpatory emperor of Guangzhou [廣州] (d. AD 942) (Guangzhou 2006: 22–23; An 2009a: 388–391, Photo 20.1., 20.2) (Fig. 11). A good example of early Islamic glass from the palace is a cylindrical bowl with vertical walls and a kick-base with a pontil mark (An 2009a: Photo 20.6 and 2010: 178, Fig. 1, 2); from the Kang Mausoleum it is a greenish transparent glass bottle with mould-blown decoration, short neck and reverted rim (An 2009a: Photo 20.3 and 2010: 181, Fig. 3).

The similar popularity of imported and locally-produced glass is well attested in the tomb of Litai [李泰] in Yun [鄖] county, Hubei [湖北] province, dated to the Tang dynasty, where Islamic glass vessels of both kinds have been found (An 1984: Table 1,2; Gan 2009, Table 2.8).

Offerings made to the Buddhist temples represent today a very important source of information on the types of imported glass products and their value in Chinese society. The most spectacular example is the discovery made in the crypt of the Famen [法門] temple in Fufeng [扶風] county, Shaanxi[陝西] province, sealed in AD 874. Eight emperors of the Tang Dynasty sending gifts every year had gradually filled the temple treasury (Figs 12, 13: A–B). After more than 1100 years, the crypt was unveiled and its interior revealed an extraordinary collection of articles of gold, silver, and other precious materials, including 20 items of glass (Famen 1988: 105; cf. Jiang 2010). The glass vessels can be divided into six categories: 1) bottle; 2) cups; 3) blue plates with scratch-engraved designs; 4) stained plate; 5) undecorated glassware; 6) glassware of

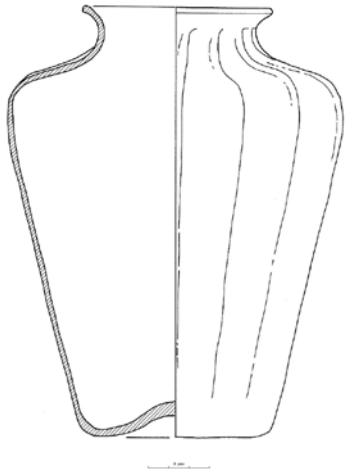

Fig. 11. Bottle from the Kang Mausoleum, Guangzhou (after Guangzhou 2006: Fig. 37). Drawing by J. Ożóg

Fig. 12. Bottle from the Famen temple, Fufeng county, Shaanxi province. Photo by B.Sz. Szmoniewski

Fig. 13. A, B – plates from the Famen temple, Fufeng county, Shaanxi province. Photo by R. Żukowski and B.Sz. Szmoniewski

domestic origin. Of importance is a pear-shaped glass bottle with circular foot and decorative appliqué on the surface (Jiang 2010: 184) (Fig. 12), which appears to be of Sasanian or early Islamic origin (Brill and Fenn 1992: 255). Another glass object is a cup formed by blowing, the body decorated with a zigzag pattern and circular ornament (Jiang 2010: 184). The set of six blue glass plates with elaborate scratch-engraved designs, decorated with branches and plant leaves, are also of high importance (Jiang 2010: 185–186) (Figs 13: A, B). The similarity to Islamic dishes is clearly evident, e.g., a plate from Nishapur in Iran (Brill and Fenn 1992: 255). According to Jiang Jie, most of the Famen Temple glasses were of Islamic origin, very close to glass vessels produced in Nishapur in Iran (Jiang 2010: 188). Two objects, a teacup and a teacup holder, may be of local make in view of an absence of parallels in the Western glass (Jiang 2010: 188). This diversity of origin of the glass objects from the Famen Temple, pointed out already by Brill and Fenn (1992: 256), reflects well the changing tastes in China for imported vessels and the main directions of glass imports over a longer period of time.

GLASS FINDS FROM KOREA

The presence of glass products is not limited to China proper. Almost 40 pieces, a large number by any standards, have been discovered in Korea (cf. Lankton *et al.* 2010: 222) (Fig. 14). Glass vessels were discovered mainly in the tombs of the Three Kingdoms period [삼국시대/三國時代, 57 BC–AD 668], especially in the ancient Silla [신라/新羅] Kingdom burials (Lee 2010). The largest number (about 25) came from the royal burials of Gyeongju [경주시/慶州市]; they represent different shapes, colours and ornament patterns (cf. Lee 2010: Figs 1a, 1b, 2a, 2b, 3, 4, 5, 6, 7, 8; Lankton *et al.* 2010: 222). Considering the similarity of the glass vessels from Korea to a familiar type of eastern Rome glass, some researchers have specified this assemblage as 'romanizing glass from Korea' (cf. Lee 2010: 214). This approach reflected the assumption that glass production in the Korean peninsula during the Three Kingdom age showed a strong influence of Western models, especially Roman glass vessels and Roman technology (cf. Lee 2010; Lankton *et al.* 2010: 222). However, new results of chemical composition analyses have demonstrated that at least some of the glass vessels may have been made in Central Asian workshops (Lee 2010: 216). Some glasses from the south mound of Hwangnamdaechong [황남대총 북분 금관/皇南大塚北墳金冠], the great double-mounded Silla Kingdom tomb in central Gyeongju, dated from the late 4th to mid-5th century AD, were made of plant-ash soda–lime glass, with magnesium oxide (MgO) at more than 1.5%, CaO up from 5–7% and Al_2O_3 between 1 and 3% (Lankton *et al.* 2010: 222). This chemical composition is not typical of either Roman or Eastern Mediterranean glass (Nenne and Gratuze 2009; Lankton *et al.* 2010: 222). The Korean glass composition most resembled the chemical composition of glass from northern

Fig. 14. Glass vessels from Korea
(after http://www.mei.edu/content/1500-years-contact-between-korea-and-middle-east)

Afghanistan, the ancient territory of Bactria and Tokharistan (Lankton *et al.* 2010: 222). New studies on the glass objects from Korea have suggested three or more types of glass being used in their production (Lankton *et al.* 2010).

GLASS FINDS FROM JAPAN

The small glass collection of western glass, either Sasanian or post-Sasanian in origin, is known from Japan (Fig. 15). As in China and Korea, glass vessels were found in burials and in Buddhist temples. Analyzing the chemical composition of the glass of the finds recently, Takashi Taniichi (2010) discovered the important role played by China in their delivery to the islands. Of greatest interest are three facet-cut bowls and fragments of relief-cut bowls. An unusual facet-cut bowl was found in the Niizawa-Senzuka [新沢千塚] Tomb no. 126 in Nara [奈良] prefecture, dated to the Kofun [古墳] period, that is, 5th century AD (Tōyō 1980: 144). The bowl is hemispherical with very thin walls and a delicate facet-cut decoration on the surface of the body and on the bottom. The glass is almost transparent with a pale greenish yellow tone. Chemical analysis identified it as plant ash glass (4.81% MgO and 3.10% K_2O) typical of Sasanian products (Taniichi 2010: 240). Similar glass vessels have been discovered on the northern coast of the Black Sea, e.g., Olbia, Tanais, Pantikapaion (Sorokina 1965: 204–215).

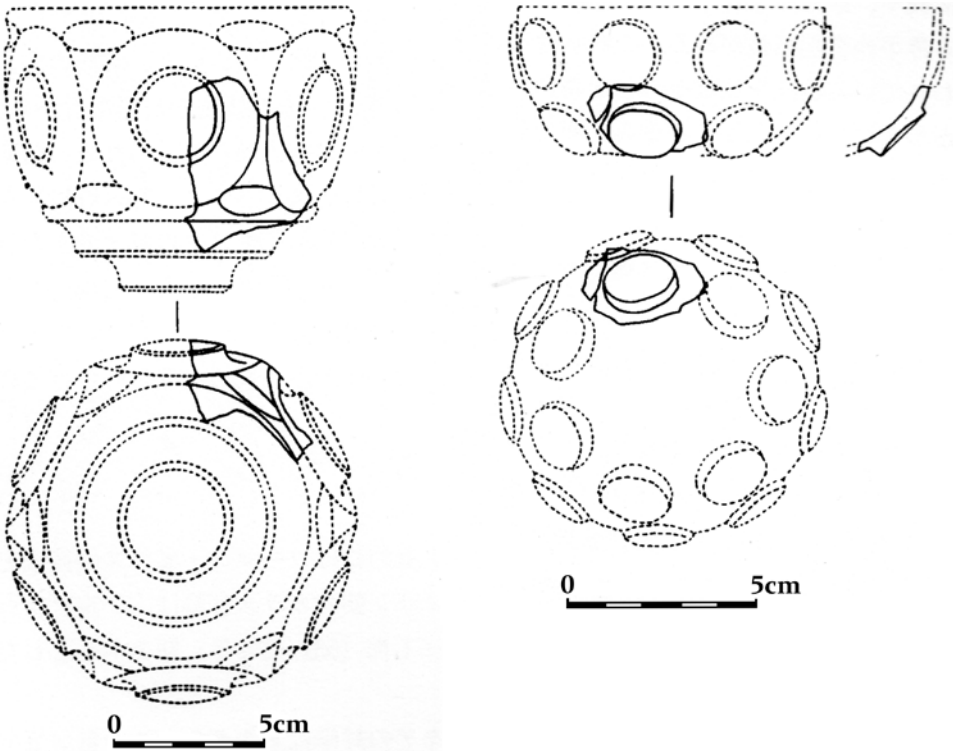

Fig. 15. Fragments of glass bowls from the Kamigamo shrine in Kyoto (left) and the Munakata shrine, Okinoshima (right) (after Okayama 1999: 98)

Two other facet-cut bowls, probably from the same workshop, are known from Shōsō-in [正倉院], from the treasury of Tōdai-ji [東大寺], Nara [奈良] prefecture (Hayashi 1975: 89, Fig. 91; Tōyō 1980: 144; Taniichi 2010: 240–242, Fig. 2) and from the grave mound of Emperor Ankan [安閑] in Habikino [(羽曳野) city, Osaka [大阪] prefecture (Hayashi 1975: 89, Fig. 91; Tōyō 1980: 135; Taniichi 2010: 242, Fig. 3). They are of a different type than the one described above, featuring thick walls and hexagonal facets covering the whole surface. The dimensions are almost identical (height 8.5 cm and 8.6 cm respectively, rim diameter 12 cm and 11.9 cm), as is the number of facets and the colour (transparent, slightly brownish). Chemical analyses of the bowls revealed that they belonged to the NaO–CaO–SiO system with 4.7% MgO and 2.3% K_2O, which is a typical composition of Sasanian plant ash glass (Taniichi 2010: 240–241). According to Takashi Taniichi, these bowls reached Japan via China as a set and then were separated. Interestingly enough, one of the bowls was used in AD 752 during the

Eye-Opening ceremony of the great image of Buddha in Nara and then was deposited in 756 in the Shoso-in treasury (cf. Taniichi 2010: 242).

Facet-cut bowls of Sasanian origin were discovered distributed over large areas of Eurasia. A large number comes from the territory of the Sasanian Empire, today in Iran and Iraq (Tōyō 1980: 135; cf. Whitehouse 2005: 43; Taniichi 2010: 241). Items exported outside the Sasanian domain have been found in Caucasus (Armenia, Georgia, Azerbajian) (cf. Whitehouse 2005: 43), the steppes of eastern European (Ukraine and Russia) (cf. Whitehouse 2005: 43; Komar 2008: 296, Fig. 4: 14) and China.

Two fragments of relief cut bowl came from site no. 8 of the Munakata [宗像] shrine on Okinoshima [沖ノ島], Fukuoka [福岡] Prefecture (Laing 1991: 118, Fig. 29; Taniichi 2010: 242–243, Fig. 4) (Fig.15). The fragments are from the lower part of a bowl made of pale green transparent glass. Cups of this type are typical examples of Sasanian glasses (Whitehouse 2005: 45–46). Parallel vessels were discovered in Iran (Whitehouse 2005: 45) as well as China (see above). One fragment of a circular facet-cut bowl was found in a backyard tomb at the Kamigamo [上賀茂] shrine, Kyoto [京都] (Laing 1991: 118, Fig. 28; Taniichi 2010: 244; Fig. 5). Bowls of this type were excavated in Kish in Iraq and in Hunzak in Dagestan (Whitehouse 2005: 48; Taniichi 2010: 244).

According to David Whitehouse, facet-cut cups can be dated from the 3rd to the 7th century AD and relief cut cups from the 6th to the 7th century AD (Whitehouse 2005: 42–48).

Of special interest is another glass object from the Shōsō-in collection, a cobalt-blue cup with 22 small rings of similar glass applied on its exterior walls, fixed in a silver stand (Harada *et al*. 1965: iii). The original stand was decorated with a dragon ornament and was probably made in Korea (Nishikawa Akihiko, Masakazu Naruse and Kiyohide Saito, personal communication), but was replaced with the new one during the early Meiji [明治] period. The similarity of its decoration to the green vessel found inside the *sarira* case in the pagoda of the Songrim-sa [松林寺] temple in Chilgok county [칠곡군/漆谷郡], North Gyeongsang province [경상북도/慶尙北道] in Korea, dated to the 7th–8th century AD (National Kyongyu Museum 1984: 39) and the presumed origin of the silver stand suggest that this object could have been imported to Japan via Korea and analogically might be of Central Asian origin.

A cobalt-blue vessel was found also in Tomb no. 126 at Niizawa Senzuka [川西町新沢千塚] in Nara [奈良] prefecture, together with the cut glass described above. It was an intact small, shallow dish made of blue glass, possibly of Mediterranean origin (Yamasaki 1965: xvi)

Another interesting object is an oblate spheroid bottle from Toshodaiji [唐招提寺] Temple in Nara [奈良] (cf. Taniichi 2010: 244–245, Fig. 6). This small bottle made of pale greenish yellow transparent glass now is used as a reliquary. Parallel finds from Egypt and Syria suggest that it may have been produced in the first half of the 8th

century AD. Chemical analysis results revealed post-Sasanian plant ash glass (5.9% MgO and 2.2% K_2O) (cf. Taniichi 2010: 245). The bottle was used for a long time, having been sealed with a metallic lid by the Japanese Emperor Go-Komatsu [後小松] in AD 1392 (Taniichi 2010: 245).

CONCLUSIONS

This short review shows that during the 1st millennium AD imported glass vessels in the East Asian context were considered as highly luxurious objects, valued for their beauty as well as mysterious character, and placed in the burials of members of the ruling families and high aristocracy. The scarcity of finds and their individual character (one vessel per type) suggest that they were curiosities rather than goods in regular trade exchange. Based on this material one can hypothesize about the directions of exchange that led to Western glass vessels being spread through China, Korea and Japan, leading eventually to their use as models for the local glass industry. There is no doubt that China was the main consumer of imported glass and at the same time played an important role in distributing objects of this kind to the more distant regions of Korea and Japan.

During the long history of Chinese civilisation different aesthetic preferences may be observed, dependent mostly on personal tastes and current fashion trends. In the first half of the 1st millennium AD, the Chinese believed that Western glass was made of a natural material (precious stone) and was very valuable. Uncommon and unfamiliar vessel shapes would have been an added value, emphasizing exotic foreign origin and, in consequence, the precious nature of these items.

About the middle of the 1st millennium AD, local glass technologies developed and diverse types of glassware started to be produced in China. Locally produced glass vessels appeared in elite graves during the Sui dynasty. Interestingly, these objects did not imitate imported glassware shapes, but followed local ceramic traditions, using popular and well recognized forms. This could reflect a switch from visually attractive objects of prestige to goods of an utilitarian nature.

In cosmopolitan Tang times (618–907), especially at the zenith of Tang power in the political and cultural centre of China, a domination of glass products in the form of personal adornments, particularly head ornaments, can be observed. These ornaments were probably produced locally and reflected local tastes. The absence of glass vessels from prosperous Tang graves and the occurrence of glass objects in middle class burials might indicate that the market was overflowing. Having become relatively easily accessible to the middle classes, the glass not surprisingly could have lost its specific 'luxurious and mysterious charm'. It is possible that glassware was replaced in part with gold and silver wares. However, the imported glass vessels never lost their

attractiveness in the more remote provincial centres, which probably did not follow capital trends and where local production was not developed to a similar degree.

Starting from the beginning of the second half of the 1st millennium AD a new trend may be observed with glass objects of high quality, mostly imported, being offered to the Buddhist temples.

In Korea, glass vessels are dated from the 4th to the 9th century AD. A large number of the imports is dated between the 4th and 5th centuries AD. Glass vessels were deposited mostly as grave goods in royal tombs. An earlier interpretation of some vessels as being of Roman origin has been refuted by the results of chemical compositional analysis which pointed to a Central Asian origin (Bactria/Tokharistan). However, Bactrian and Tokharistan craft work, not only in glass but also in gold and silver, was under a strong influence of the Greco-Roman cultural tradition.

In Japan, the end point of the Silk Road in the East, the few glass vessels discovered came through China. Most are typical examples of the Sasanian and post-Sasanian workshops and, analogically to the other East Asian regions, they were deposited in the highest elite burials and temple treasuries. It cannot be excluded, however, that some objects were imported via the Korean peninsula from Central Asia.

Most of the vessels were imported between the 5th and 7th century AD. The only late example is the bottle from the Toshodaiji temple. This item is also interesting for its long usage after it reached Japan, from the 8th to the 14th century AD. This confirms its special value. Having only a small group of imported glass vessels found in archaeological contexts in Japan, it is difficult to understand why Islamic glass lost popularity on the islands, while still being imported to China and offered to the Buddhist temples on the continent.

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