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Early postmedieval and postmedieval glass finds from two waste pits from the inner court yard of the Salm Palace in Prague

ANNOTATION

This study presents the analysis of glass artefacts found in two waste pits at the inner courtyard of the Salm Palace in Prague Hradčany. The pits, however, were used by the residents of the neighbouring Schwarzenberg Palace. Both glass assemblages were analysed from an archaeological and archaeometric point of view. This study confirms great significance and importance of such interdisciplinary cooperation. Chemical analysis of 35 samples showed a clear predominance of potassium glass. Sodium-ash glass is represented only by a goblet fragment with a mascaron-shaped knop and by a glass button. Although both studied assemblages are of a similar, more or less identical date – from the second half of the 17th century to the 18th century, morphologically they perform certain diversity. Both table, window and especially container glass was identified. The unique finds include fragments of a mirror and a richly decorated glass button.

SUMMARY

Extensive reconstruction and modification of the Salm Palace instigated rescue archaeological excavation, carried out from January 2009 to July 2010 (Fig. **1**). This study presents the analysis of glass artefacts found in the waste pits 22/23 and 23, which were located in the inner courtyard of the Salm Palace. The pits, however, were used by the inhabitants of the neighbouring Schwarzenberg Palace. Glass artefacts are analysed from both archaeological and archaeometric point of view. The greatest attention is paid to glass finds, which have been completely or at least partially reconstructed. The chemical composition was determined using a scanning electron microscope with either a wave (WDS) or energy (EDS) dispersion detector, or X-ray fluorescence (XRF). Trace elements were determined by laser ablation with inductively coupled plasma in conjunction with mass spectrometry (LA-ICP-MS).

The stone built waste pit 22/23 was located at the interface of trenches 22 and 23 (Fig. **2**). The upper part of the fill consisted of construction waste. This was followed by a 2.0 m thick strongly organic formation, which was divided into 17 layers (285–301; Fig. **3**). The fill of the waste pit was very rich in finds, apart from glass artefacts, also fragments of table and kitchen ceramics, oven tiles, metal objects, wooden artefacts, construction waste remains, and fragments of textiles have been preserved (BLAŽKOVÁ 2018). Twenty-six wooden artefacts have been dendrochronologically dated (KYNCL 2009). The vast majority of woods were dated to the period 1628–1653, from which the author of the analysis states the expected time of tree felling just after the mid-17th century. Plant species composition of the waste pit was determined by archaeobotanical analysis (KOSŇOVSKÁ 2009). The specified plant species were sorted into several groups – utility, light-loving, ruderal, weeds, moisture-loving, meadows and pastures. Utility plants accounted for more than 50% of the identified diaspores. A special finding was rice husks. From the waste pit 22/23, 38 glass vessels were partially or completely reconstructed, 24 were chemically analysed. The glass assemblage contained a considerable number of glass bottles and phials of various sizes, both with a rectangular and circular foot (Fig. **4**). Also fragments of five goblets were identified (Figs. **5–7**, **13**), some of them prestige ware with an inner red or blue thread in the stems (Fig. **6**, **7**). Represented is also goblet with the stem in the shape of a lion mascaron (Fig. **13**), which was made of sodium-ash glass. The most distinctive glass finds from the waste pit 22/23 are two glass jugs, one of dark blue and the other light blue colour, made of opaque, potassium ash glass (Fig. **8**). Iron oxides were used to obtain the blue colour. The resulting turbidity in the glass was caused by a calcium phosphate $Ca_3(PO_4)_2$, probably due to the use of bone meal (JONÁŠOVÁ/CÍLOVÁ 2012). Among the glass artefacts also two fragments of the mirror were identified (Fig. **9**). Chemical analysis identified potassium potash glass used for the production of the mirror. Sodium ash glass, on the other hand, was used for the production of richly decorated, unique glass button (Fig. **12**).

The second stone built waste pit was revealed in trench 23 (Fig. **14**). The fill of the pit was divided into 19 layers. The lower part of the fill with a total thickness of about 1.0 m consisted of 12 layers (Fig. **15**), some of them described as mortar crumbling. Since these layers are repeated and regarding the way the feature was used as a waste pit, they could be hygienic separation layers. Both kitchen and table ceramics were represented in the fill of

the waste pit. The glass artefacts from the waste pit 23 come from two layers – the stratigraphically later contexts 128–131 and stratigraphically earlier formation 132–138. With the exception of tankards (Fig. **16**), which were made of potassium, potash glass, all other analysed samples were determined as potassium, ash glass. Both tankards come from the stratigraphically later contexts. In the same part of the fill was a neck fragment of a kuttrolf, a substantially reconstructed part of a bottle and a stem fragment with a foot decorated with a stylized plant motif, resembling Venetian patterns (Fig. **17**). A low bowl and a small pear-shaped bottle (Fig. **19**) come from the contexts 132 and 133. The most numerous group of at least partially reconstructed shapes from the stratigraphically earlier formation consists of goblets (Fig. **18**). The best preserved is a goblet with a semi-oval knop with a simple ring decorated with a spiral of fused fibre and an optical vertically ribbed decor (Fig. **20**).

The ceramics and glass artefacts date the use of both waste pits from the second half of the 17th to the end of the 18th century. Compared to the early postmedieval period, an increase in simple glass bottles is evidenced in the glass assemblage, which probably served as a transport and packaging material. Representative table glass, which is an integral part of early postmedieval finds from the urban environment, is represented to a lesser extent in both waste pits.

The more or less identical dating of both waste pits enabled to chemically evaluate the glass artefacts together (Fig. **21**). Corrosion weathering caused by long-term deposition in waste pits is evident on all studied samples. Regarding the chemical composition (KŘÍŽOVÁ ET AL. 2018a) of these in form relatively heterogeneous assemblages from waste pits 22/23 and 23, only two objects were made of sodium glass (Fig. **21**). It is a fragment of a goblet with lion heads (mascaron, Fig. **13**) and a knop (Fig. **12**). Chemical analysis of mascaron identified its foreign origin as the Venetian vitrum blanchum. The other objects studied were made of potassium glass. This can be divided into two main groups: (1) ash glass and (2) potash glass. Ash glass group (SiO_2 content < 66 wt.%, K_2O > 9 wt.% and CaO > 13 wt.%, MgO > 1 wt.%, P_2O_5 > 0.5 wt.%, Sr > 250 ppm and Ba > 1 000 ppm) includes samples that are visually of lower quality. Compared to potash glass, all ash glasses are enriched mainly with magnesium, phosphorus, strontium and barium. This is due to the technological process where potash was obtained by cleaning the ash. The contents of MgO, P_2O_5 in potash glasses are < 1 wt. %, the strontium and barium content did not exceed 100 ppm and 500 ppm. Potash glass items are clear and colourless. They are characterized by a SiO_2 content > 72 wt. %, K_2O > 10 wt. % and CaO < 10 wt. %. The contents of MgO, P_2O_5, Al_2O_3, and Fe_2O_3 do not reach the values of one percent (KŘÍŽOVÁ ET AL. 2018b). The chemical composition of the mirror is different from utility/table glass. This glass has similar contents of MgO, P_2O_5 and Al_2O_3, but the CaO content is much higher and SiO_2 lower than the other potash glass analysed. The chemical composition indicates the use of a different recipe of the glass stem and probably also different raw materials. Items designed as potassium glass can be assumed to have been made in Central Europe, most likely in the Bohemian lands. Potassium glass was also identified in the stems with internal coloured thread (Fig. **6**, **7**). The production centres of these richly decorated prestige goblets are usually presumed in northern Italy, the Netherlands or Germany.

Chemical analyses showed the coexistence of potassium ash glasses and clear potash glasses. The technological change was confirmed, when potash began to be used instead of ash in the production of glass.

Fig. 1. Hradčanské Square No. 186/IV (Salm Palace). **Orange** – areas of rescue archaeological excavations from 1988 to 2013; **red** – position of waste pits. The **arrow** on the photo indicates the location of waste pits (compiled by F. Adámek, 2020).

Fig. 2. Hradčanské Square No. 186/IV (Salm Palace). Waste pit 22/23 marked in **red**; **a** – the west side of the pit; **b** – the eastern side of the pit; **red arrow** – location of the western section of its fill (photo ARÚ archive, compiled by F. Adámek, 2020).

Fig. 3. Hradčanské Square No. 186/IV (Salm Palace). Waste pit 22/23, generalized western section of the fill with projected upper part of the western side of the pit (edited by F. Adámek, 2020).

Fig. 4. Hradčanské Square No. 186/IV (Salm Palace), waste pit 22/23. Analysed glass bottles (photo by G. Blažková, V. Pincová, drawing by V. Pincová, 2020).

Fig. 5. Hradčanské Square No. 186/IV (Salm Palace), waste pit 22/23. Glass goblets RG 33, RG 34 (photo by G. Blažková, drawing by V. Pincová, 2020).

Fig. 6. Hradčanské Square No. 186/IV (Salm Palace), waste pit 22/23. Glass goblet RG 11; analogy **A** – V&A Museum London [online] (photo by Š. Křížová, drawing by V. Pincová, 2020).

Fig. 7. Hradčanské Square No. 186/IV (Salm Palace), waste pit 22/23. Glass goblet RG 2; analogy **A** – Prague, New Town, No. 135/II, Národní–Mikulandská, excavation by NPÚ Prague No. 2013/33, bag no. C09-071 (photo by Š. Křížová; drawing by V. Pincová, 2020; A – M. Frouz).

Fig. 8. Hradčanské quare No. 186 / IV (Salm Palace), waste pit 22/23. Glass jugs RG 12, RG 13 (photo by Š. Křížová, drawing by V. Pincová, 2020).

Fig. 9. Hradčanské Square No. 186/IV (Salm Palace), waste pit 22/23. Mirror RG 38 (photo, drawing by V. Pincová, 2020).

Fig. 10. Hradčanské Square No. 186 / IV (Salm Palace), waste pit 22/23. 1, **2** – phials; **3** – narrow-necked jug (photo, drawing by V. Pincová, 2020).

Fig. 11. Hradčanské Square No. 186/IV (Salm Palace), waste pit 22/23. Window glass (photo, drawing by V. Pincová, 2020).

Fig. 12. Hradčanské Square No. 186/IV (Salm Palace), waste pit 22/23. Glass button RG 44 (photo by Š. Křížová, drawing by V. Pincová, 2020).

Fig. 13. Hradčanské Square No. 186/IV (Salm Palace), waste pit 22/23. Fragment of a goblet with a mascaron knop RG 15; analogy **A** – Bratislava, Ventúrska 3, inv. No. BrVe3-1-127 (photo by G. Blažková, drawing by V. Pincová, 2020; photo A see note 15).

Fig. 14. Hradčanské Square No. 186/IV (Salm Palace). Waste pit 23 marked in **red**; **a** – the inner space of the pit from the east, **b** – the pit from the south; **red arrow** – location of the western section of its fill (compiled by F. Adámek, 2020).

Fig. 15. Hradčanské Square No. 186/IV (Salm Palace). Waste pit 23, western section of its fill (photo ARÚ archive, edited by F. Adámek, 2020).

Fig. 16. Hradčanské Square No. 186/IV (Salm Palace), waste pit 23. Glass tankards RG 18 and RG 32 (photo by G. Blažková, drawing by V. Pincová, 2020).

Fig. 17. Hradčanské Square No. 186/IV (Salm Palace), waste pit 23. Fragment of kuttrolf RG 35 – reconstruction drawing; glass goblet RG 26; quadrilateral glass bottle RG 22 (photo by G. Blažková, V. Pincová, drawing by V. Pincová, 2020).

Fig. 18. Hradčanské Square No. 186/IV (Salm Palace), waste pit 23. Glass goblets RG 7, RG 27 and RG 28 (photo by G. Blažková, drawing by V. Pincová, 2020).

Fig. 19. Hradčanské Square No. 186/IV (Salm Palace), waste pit 23. Glass bowl RG 17; glass pear-shaped phial RG 25 (photo by G. Blažková, drawing by V. Pincová, 2020).

Fig. 20. Hradčanské Square No. 186/IV (Salm Palace), waste pit 23. Glass goblet RG 6 (photo by G. Blažková, drawing by V. Pincová, 2020).

Fig. 21. The principal components analysis clearly classified the glass assemblage into sodium, potassium ash, and potassium potash glasses.

Translation by Linda Foster