THESISES OF Ph. D.

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Glass Vessels from Late Roman Times Found in Graves in the Hungarian Part of Pannonia

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1. The topic and the purpose of the dissertation

The primary goal of the dissertation is to give a detailed presentation of late Roman glass vessels found in graves in the Hungarian part of Pannonia and also to set up a typology considering colours, qualities, details and decorations, which fields havent't been investigated in the Hungarian resarches so far. Apart from this the secondary goal is to analyze the chronological and the geographical diversity of glass types, which led to the definition of the tendencies in glass usage and of the areas that belonged to different workshops.

Thousands of graves in Pannonia, in which several glass finds were found, can be dated in the late Roman period,. Only those graves are analyzed in this dissertation that belong to the current territory of Hungary. As a result of this, the research studies only Pannonia Prima and Valeria provinces.

This dissertation deals with the graves from the beginning of the 4th cent. AD to the middle of the 5th cent AD, so the surrender of Pannonia wasn't regarded as a closing date. The possibility of the continuation of Roman-like glass producing in the 5th cent. AD. has been observed. Certain specimens, found in Barbaricum, outside the borders of the province can be identified as Roman-like products due to similar producing techniques, shapes, colours, qualities and decorations. However they are not included in my catalogue. Since the colour, quality, design, detail and decoration can be studied by holding the vessels in hands, only those finds are listed in the dissertation, which could have been examined this way. Without investigating there essential characteristics this research wouldn't have been carried out properly. Being aware of the forms is not enough. Unfortunately a terminology of glass objects in Hungary hasn't been provided yet. The drawings don't reflect the exact details of the vessels therefore, I have skipped to the finds that could have been examined personally.

The system of glass objects on the basis of their functions has been applied wide-spread since the 1990s. According to S. M. E. van Lith and K. Randsborg the glass vessels can be divided into three basic groups, and within them six smaller ones can be differentiated. To classify the vessels studying the shapes of them doesn't provide us enough information hence the analysis of the producing techniques, the colours, the quality of the materials and the forming of the parts of the vessels are inevitable. A 5-stage scale has been used to rate the qualities of the materials. The catalogue lists drawings of intact vessels and definable fragments. The markings of the decorations and the details of the objects are attached in the appendix.

2. The structure of the dissertation

The first chapter of the dissertation is the Introduction, which consists of three parts: the first part introduces the topic and the goals of the dissertation (1.1); the second part includes the enumeration of Hungarian terminologies (1.2); and in the last, part my typology system is described including the numbers and the definitions of the different type of vessels as well as the connection with other well-used typologies and the connection with L. Barkóczi's catalogue (1.3).

The history of the research of glass vessels (2.1) can be found in the second chapter concerning some problematic areas and Hungarian researches in this field (2.2).

The third chapter demonstrates the chemical and physical characteristics of the glass, including the principal consistent and other additives (3.1). It also runs a time line on the materials and procedures used in the ancient times. It mentions the importance and the role of the chemical analysis (3.2).

The fourth chapter is an extremely detailed description of the process of manufactures, in which I review the producing methods (4.1) and decorating techniques (4.2).

In the fifth one those archaeological sites and cemeteries are listed to which the finds, used as the basis of this dissertation, are related.

Chapters from sixth to ninth manage the detailed analysis and classification of the collected and defined glass vessels from late Roman times. The interpretations are according to the order of my typology and to the categories of functions. In the sixth chapter the tablewares, in the seventh one the storage and transport vessels, in the eighth one the unguentaria, and in the ninth chapter the vessels with undefined function are profiled.

In the tenth part I summarize the possibilities of placing the glass vessels in graves, also the correspondences between them and other finds. Some interesting examples of recycling can be also mentioned.

The eleventh chapter includes the analysis of the decoration systems. The twelfth chapter is an introduction on the capacity of the glass vessels, and their connection with the Roman measures.

The thirteenth chapter presents the results of the research, and then the dissertation is closed with a bibliography and a catalogue of almost 1000 objects.

3. Typology

There hasn't been a consistent system for the definition of shapes, so it can occur that the same form might be defined differently by the authors. L. Barkóczi's catalogue cannot be considered as complete, although it includes 556 vessels. He analysed only the intact vessels (while the research of the fragmentary vessels is also important), and the 556 finds derive from the entire period of Pannonia, whilst my dissertation includes 987 objects only from the 4th and 5th cent. AD, which means I examined the finds on the basis of a wider database.

For this reason a new typology of the specific area and time period was needed. To establish the new typology I have used the works written by B. Rütti, H.M.E. Cool-J. Price, I. Lazar, G. Harter, C. Isings, S. Cottam -J. Price, and S. Jennings.

In spite of having followed the groups of functions created by S. M. E. van Lith-K. Randsborg, their notation of the categories hasn't been used. I marked the types with the first initials of their generally used Hungarian names, which seemed to be easier. So the types of the A1 category are marked with the letter T (*Tál* – bowl), the forms of the A2 category have the letter P *(Pohár* – cup), the A3 category is letter K (*Korsó* – jug), the B1 category is Pa, the B2 category has the letter F (Fazék – jar), and the C category is signed with the letter I (*Illatszeres* – unguentaria). The fragments, wich couldn't be classified, got the sign E (*Egyéb* – other), like it was also used by I. Lazar és G. Harter.

Another number is added to the number of the types, which marks whether the vessel was decorated or not. Nr. 1 variant stands for being undecorated and Nr. 2 variant stand for being decorated. Sometimes more decorations vary on one vessel, so with this classification the combination of decorations can also be studied.

The last element of the typology system is the usage of A and B variants, which reflect important shaping details. In the case of bowls, cups, jars, bottles and perfume holders the variant A means rims with cutting edge, while the variant B marks fire-rounded rims. It denotes a different meaning in the case of jugs, where the rims were always fire-rounded, so the variants A and B reflect to the elaboration of the base.

4. The main results of the dissertation

The main results of the analysis, typology and classification, the chronological and geographical spread of the almost 1000 glass finds are summarized in this extract.

In the late Roman period of Pannonia mainly tablewares were produced; the 57,9 % of the finds belong to this category. Within this group drinking vessels dominate, since they amount to 45,5 % of all vessels. Bowls and dishes (A1) basically lost their importance and represent only 2,2 % of the total finds, so they can be found sporadically. There is no tendency in the distribution of the bowls, they occured both along the *limes*, and inside the province. Most bowls were found in Intercisa and Sopianae, but there are a few known from Ságvár, Aquincum, Brigetio, Scarbantia, Somogyszil, Mórichida-Kisárpás and Keszthely. The dishes from Aquincum and Brigetio can be dated back to the beginning of the 4th cent. AD. The number of jugs for serving liquids (A3) is higher than the number of bowls, they represent 10,1 % of the total finds. There is no difference in their distribution between certain territories; they were used along the *limes* and in bigger cities too (e.g. Solva, Intercisa, Sopianae, Aquincum, Mórichida-Kisárpás, Ságvár).

Amongst the storage and transport vessels only the group of bottles (B1) has notable figures; 20,2% of them are vessels for storage of liquids with closed shape. They were found in Aquincum, Brigetio, Solva, Intercisa, Pilismarót, Ságvár, Sopianae in large amounts, so they were concentrated in the Danube bend and in the vicinity of Pécs. There are only 1 or 2 pieces from other sites. The usage of jars for storage of foods (B2) completely ended; only one jar was found among the finds in the sarcophagus of Szekszárd.

The frequency of *unguentariae* decreased in comparison with its usage in the previous centuries, but they often appeared in late Roman times. They represent 18,8% of the analysed finds. Their presence was not rare, since they can be found in graves till the end of the 4th cent. AD., which means that their usage wasn't abandoned. Several unguentariae were placed in one grave in the early Roman period. Meanwhile, only one perfume bottle was placed in one grave in the late Roman period. Lots of *unguentariae* were found especially in Sopianae, Brigetio, around Solva, Aquincum, Bátaszék-Kövesd, Intercisa and Ságvár.

The last category includes objects which cannot be surely classified into any of the categories, such as flasks for pouring and *vasa diatreta* with controversial function. 2,5% of the vessels belong to this group.

Based on the classification into functional categories and the analysis we can draw the conclusion that the proportion percentage of category A2 extremely increased and this is followed by category A3, whereas the number of bowls diminished significantly.

According to S. M. E. van Lith and K. Randsborg any divergence from the average tendency regarding of the frequency of the different categories in the late Roman period reflects the different economical conditions in different settlements. There is no deviation in Pannonia. Vast number of vessels occurred in Ságvár, Sopianae and its vicinity, and the sites of the Danube bend, first of all Solva. Ságvár is the only place where the rate of cups is not prominently higher than the rate of other categories.

Among the bowls the most typical form is the shallow convex bowl (T 1) which might be decorated with wheel-cut lines or abrasion bands. The second type is the shell shape, mould-blowed bowl (T 3). The presence of convex bowls with indents is sporadic (T 2). Only one cylindrical plate decorated with concentric circles at its bottom is known (T 4). The last category of bowls is represented by one plate, which is a wide, flat cylindrical one with facet-cutting (T 5). The first three types were typical in the second half of the 4th cent. AD., and may have also existed at the beginning of the 5th cent. AD. The last two types are dated back to the beginning of the 4th cent. AD.

The most common glass objects as burial finds from the late Roman period were cups. 453 vessels out of 987 are cups, so nearly half the amount of the glass finds belong to this group. These cups share the general characteristic of being good quality and being made mainly of colourless or naturally coloured glass till the last third of the 4th cent. AD. However, at the end of the 4th cent. AD. and in the 5th cent. AD. the dominant colours were the moss green and strong yellow/green ones, and the material of the glass is generally worse and full of bubbles and strains. Considering the rims, cracked-off rims were formed and polished from the beginning of the 4th cent. AD., although sometimes the cracked-off rims were left rough, which method became more and more dominant from the end of the century.

Slim beakers with curving body (P 1), slim beakers with curving wall and a base ring (P 2), slim, cylindrical beakers (P 3) and slim, cylindrical beakers with a base ring (P 4) can be related to one workshop on the grounds of their same qualities, colours, measures, decorations, rims, and their chronological and geographical spread. The workshop may have operated at the end of the 3rd cent. AD, or rather in the first half of the 4th cent. AD. These forms particularly occurred in the vicinity of Arrabona, Brigetio and Aquincum in this short period of time. In Pannonia the hemispherical cups (P 5), which are wide-spread and popular throughtout the Empire from the 4th cent. AD till the beginning of the 5th cent. AD., are represented in large amounts. In Pannonia these cups are made of colourless glass with a good quality and they are partly decorated, sometimes including abrasion bands, and their rims are usually cracked-off and unpolished. This type is more typical in the first two-thirds of the 4th cent. AD.

The usage of hemispherical cups with a base ring (P 6) was also frequent between the first third of the 4th cent. AD. and the 380's AD. Their export and expanse are similar to

the previous type. One of the most important cup forms is the mould- blown convex one with curved rim ("half-egg-shaped) (P 7). There are 67 pieces of these originated from Pannonia. They became popular from the middle of the 4th cent. AD., when they were made of natural green and colourless glass with good quality. Their usage was at its peak at the end of the 4th century and in the first half of the 5th cent. AD. They were made of a worse material in a strong yellow/green colour and after Pannonia had been surrendered they still remained popular in the Carpathian Basin during the 5th cent. AD. They were probably produced in Pannonia since their material regarding its colour and qualities and the working process are the same as the ones of the optic-blowing, globular flasks, cylindrical and pear shaped jugs and the smaller *unguentaria*, which were all found in large quantities. The representatives of P 7 from the 5thcent. AD. may have been products of a surviving glass workshop as their identical colour, form, quality, shaping of rims and decoration are similar to the ones from the end of the 4th cent. AD. and the beginning of the 5th cent. AD. The significant group of conical beakers (P8-10) covered 35% of the finds. However, the P 8 type, which is the conical beaker with a base ring occurred in a smaller amount and there are 44 pieces listed in the catalogue. Its presence was typical in the first third of the 4th cent. AD. and at the end of the century. Conical beakers with a flat base (P 9) can be found in the biggest amount including 138 pieces, more than half of which are undecorated. Most undecorated pieces have vertical fire-rounded rims, while the decorated pieces have cracked-off rims. On the one hand, they were generally made of colourless or green glass with proper quality, on the other hand yellow/green and dark green coloured beakers with poor quality were also found. The decoration mostly includes abrasion brands, or it is the combination of abrasion brands and wheel-cut lines. Blue chips were rarely used as a decoration. The last type of the conical beakers is the one with small, flattened, rounded base (P 10). This type didn't appear in many places in the Roman cemeteries in Pannonia. There are only 9 examples of them. In all cases they were made of colourless or glass green material attributing good quality. The rims are cracked-off, but polished afterwards. All of them are decorated, apart from the special piece from Mosdós with a decoration of facet–cutting cells. The P 10 type was decorated either with thick, wheel-cut lines, or with abrasion brands. Their difference in size, quality, decoration from the other conical beakers results in the conclusion that, they may have been used as lamps. There are only a few models of both the *scyphos* (P 11) and the Kowalk type beakers (P 12) known from the late Roman period, which might not have been local productions. Cylindrical beakers with stem and foot (P 13) from Pécs could be dated back to the second half of the 5th cent. AD., since this type became popular in this period of time.

Studying jugs the most common type is the globular jug (K 1), which was typical in urban settlements. The majority of this type are decorated either with single horizontal trails under the rim or by optic-blowing. The indented globular jug belonging to this group with decorated base ring found in Savaria is quite special. This type existed from the first third of the 4th cent. AD in Pannonia, and was widely used in the second half of the century, but

the strong yellow/green versions of it still occurred during the first half of the 5th cent. AD. Cylindrical jugs (K 2) were typical along the *limes* between Mórichida and Intercisa and also in Pécs and Ságvár. Their decoration involves single horizontal trails under the rim, and thin spiral trails on the neck. The jug found in Ságvár is special for its single horizontal trail under the rim and for its handles, both of which were made of translucent, dark blue glass. Three-quarters of the pear shaped jugs (K 3) are decorated. Three of them are unique. The translucent dark blue jug from Mosdós is remarkable. It was made by optic-blowing and its decoration is a spiral trail on the neck. On the body of one of the jugs found in Brigetio diagonal ribs can be seen, and finally the decoration of a jug from Pécs consist of abrasion bands and facett-cutting ovals. This type was common in the 4th cent. AD, but wasn't popular in the 5th cent. AD.

I have grouped the vessels for storage into eleven different types. The majority of these vessels can be classified into the first group of the globular bottles (Pa 1). Three-quarters of them are undecorated. The typical decoration of the rest is made by optic-blowing or includes abrasion brands. The usage of this type was wide-spread from the end of the 3rd cent. AD. till the first half of the 5th cent. AD. The type of globular bottles with funnel mouth (Pa 2) is less frequent, and can be found only from the end of the 3rd cent AD. to the first third of the 4th cent. AD. One of its representatives with an unfinished rim consisting of cylindrical *moiles* was classified as a separate type by L. Barkóczi, whereas it can be ranged into this type. The group of Pa 3 bottles includes only one piece with a funnel pulled-in neck, which was found in Majs. The last globular bottle type (Pa 4) have a base ring and often have two loop-handles. Only a few specimens are known from the first half of the 4th cent. AD. One of the bottles from Páty has double abrasion brands on its neck and doubled wheel-cut circles on its body. The next type is the cylindrical bottles with rounded shoulder (Pa 5), which was in use in the second half of the 4th cent. AD. and at the beginning of the 5th cent. AD. They are usually made of strong yellow/green bad-quality glass and almost half of them are decorated by optic-blowing. They particularly occurred along the Danube bend between Arrabona and Intercisa. The square bottles (Pa 6) are rare in the late Roman times in Pannonia. Their base usually doesn't have a pattern, but *pontil* marks can be identified on them, which mean that the separate base form did not take part in their production. The hexagonal undecorated bottles (Pa 7) weren't common either; only three pieces of them are known. The type of decagonal bottles (Pa 8) has only one example among the finds. The last group consisting bottles is the large cylindrical one with horizontal shoulders (Pa 9). They were made of strong yellow/green glass full of tiny and dark specks. They used to be divided into three or five fields by abrasion lines and decorated with facett-cutting ovals. Their usage can be dated back to the second half of the 4th cent. AD. and the first half of the 5th cent. AD. The *amphora* with a base knob (Pa 10) has opaque, blue and single horizontal trails under the rim and handles and was made of strong yellow/green glass. Its body is divided into 3 spheres, which contain some abrasion lines and cell shaped facet-cutting pattern. It can be originated from the last third of the 4th cent. AD. to the first half of the 5th cent. AD. The

globular *amphora* with a base ring (Pa 11) was made by optic-blowing and has opaque, dark blue base and handles. It can be dated back to the first half of the 4th cent. AD. Only one jar (F 1) is known from the sarcophagus of Szekszárd.

The group of *unguentariae* is the most various one regarding their shapes, but each type often includes only 1 piece. The most frequent form is the globular *unguentaria* (I 1). This type is mainly asymmetric, the body of the vessel as well as the neck lean into one of the directions and they were made of worse quality glass than the free blown vessels from previous periods. The presence of this type can be detected till the end of the 4th cent. AD. The type of globular *unguentaria* with funnel mouth and rolled-in rim (I 2) is less frequent, and typical only in the 4th cent. AD. The small, indented globular *unguentaria* with wide, cylindrical neck (I 3), is represented only by one piece, which is from Ságvár from the 4th cent. AD. The group of drop shaped types (I 4) is also rare in the 4th cent. AD. and it consists of only three pieces. The same stands for conical unguent bottles (I 5). The forms of I 6-11 include indented unguent bottles, each form represented by only one find. The differences between the types range from the various shapes of the bodies, the length and form of the necks and the shape of rims to the numbers of indents. The form I 12 contains only one specimen from Esztergom-Bánom. It is a small bottle with cylindrical body and neck and it has a funnel rim. There are no parallels of it. The form I 13 covers small jar- shaped unguentaria with double curved rim, which is exemplified by one piece from Pécs and has no analogy so far. The form I 14 is an indented, hexagonal *unguentaria*. The piece of this type found in Brigetio has no parallel. The small, conical *unguentariae* with funnel rim were classified into the group I 15. I 16 contains the rod shaped, long, narrow type without neck. The form of flattened, globular *unguentaria* (I 17) has only one example from the 4th cent. AD. The most frequent type is the I 18, which is a long, narrow, pipette shaped unguent bottle. There are a small and a large variant. More than 50 pieces of this type were found in Pannonia. They were used from the second third of the 4th cent. AD. till the first half of the 5th cent. AD. The form I 19 includes unguent balls without neck and rim. There is only one specimen found in Pécs. Its presence in the 4th cent. AD. is exceptional. The appearance of *aryballos* (I 20) is rare in the late Roman times; there is only one piece of this type known from Ságvár, which was decorated with single horizontal trails.

The category E 1 embodies only one piece from a man's grave in Bátaszék-Kövesd. It is a small, cylindrical vessel with a base knob and a cutting enge rim. its body is decorated with abrasion bands. It was probably used as a lamp. The category E 2 includes the animal shaped vessels which were uncommon in the late Roman period. In the group E 3 small (12-15cm high), stretched, conical shaped vessels are listed, whose bodies have a similar shape like the amphorae with a base knob, but with a funnel neck. Since they don't have handles and their necks are different, they can not be classified as amphorae. One of them was found in Pécs, the other one is from the cemetery of Páty. Their exact parallels are not known; they could have been either drinking vessels, or *unguentaria* or

lamps. The piece from Pécs is decorated with abrasion brands on its neck and body, and a small, tubular handles were attached to its shoulder so that it could be hung up. This proves that they may have been used as lamps. The category E 4 covers flask for pouring. They were frequent till the last third of the 4th cent. AD., then their presence became sporadic and only 3 pieces date from the end of the century to the beginning of the 5th cent. AD. The category E 5 includes six small jar shaped vessels from the second half of the 4th cent. AD. *Vasa diatreta* belong to the group E 6.

It is also worth mentioning that some parts of some vessels were recycled. For example the base rings of jugs that were placed into children's graves as cups, or the rounded bases of large *unguentaria*e (type Isings 105) which were reused as corks.

Glass making in Pannonia was not over with the surrender of the province, as the analysis of glass vessels found in cemeteries has proved that Roman-like glass vessels were produced at least till the middle of the 5th cent. AD., or till the end of the 5th cent. AD. By the end of the century the demands for them had changed, and the variety of shapes reduced.

From the second half of the 4thcent. AD. two regions are notable concerning the geographical spread of the glass vessels. One of them is along the *limes* between Arrabona and Intercisa, of which area the Danube bend is the most remarkable since more than half of the vessels (53%) were found in this region. The other zone was the city of Sopianae and its vicinity where 20% of the vessels were uncovered. These had a wide variety of forms. In the cemeteries of this area unique forms also occur. Their shapes have their parallels from the second half of the 5th cent. AD. throughout the Empire. The geographical extent refers to the existence of a late Roman glass workshop in the area of Pécs and the Danube bend, which supplied these regions with vessels. L. Barkóczi's theory regarding the presence of a workshop in Csákvár can be neither excluded nor proven. The glass finds from the cemetery of Ságvár (inside the province) are quite special due to their unique forms, high quality, and their functional proportions, which are different from characteristics of vessels from other parts of the province. Apart from the regions mentioned above, the number of glass vessels drastically decreased in the late Roman period in Pannonia.