

## Analyses of late antique glass from Tonovcov grad near Kobarid in archaeological context

### Analize poznoantičnega stekla s Tonovcovega gradu pri Kobaridu v arheološkem kontekstu

Tina MILAVEC, Žiga ŠMIT

#### Izvleček

Z arheometričnimi metodami smo analizirali steklene posode, jagode in okensko steklo iz poznoantične utrjene višinske naselbine Tonovcov grad pri Kobaridu v zahodni Sloveniji. Večina analiziranega gradiva pripada poznorimski (od 4. do zgodnjega 5. st.) in poznoantični (od poznega 5. do zgodnjega 7. st.) fazi naselbine. Rezultati so pokazali, da je bila večina od 43 analiziranih vzorcev narejena iz steklene mase Levantine I, ki izvira iz sirsko-palestinskega prostora, nekaj pa jih je bilo narejenih iz stekla drugega izvora. Kljub načeloma zelo avtarkičnemu značaju poznoantičnih višinskih naselbin analize stekla nakazujejo, da so bile vsaj deloma dobro vključene v sredozemske tržne poti.

**Ključne besede:** pozna antika, Slovenija, Tonovcov grad, arheometrične analize, steklo

#### Abstract

Archaeometric analyses were performed on glass vessels, beads and window glass from the late antique fortified hilltop settlement of Tonovcov grad near Kobarid in western Slovenia. Most of the analysed material belongs to the late Roman (4<sup>th</sup>–early 5<sup>th</sup> c. AD) and late antique (late 5<sup>th</sup>–early 7<sup>th</sup> c. AD) settlement phases of the settlement. The results showed that the majority of the 43 analysed samples were made of the Levantine I glass mass of Syro-Palestinian origin while a few were made using raw glass of different provenance. Despite the generally very autarkic character of late antique hilltop settlements, the results of the glass analyses indicate that at least, in some ways, they were well integrated into the Mediterranean trade routes.

**Keywords:** Late Antiquity, Slovenia, Tonovcov grad, archaeometric analyses, glass

#### INTRODUCTION

In separate papers and in the second publication volume on the late antique fortified hilltop site of Tonovcov grad near Kobarid in western Slovenia, glass was presented with other small finds from the site and in a summary chapter on late antique glass in Slovenia.<sup>1</sup> Later, studies on window glass

from the settlement were published separately.<sup>2</sup> During the work on glass, archaeometric analyses were performed on 43 fragments. These analyses were not completed when the monographs went to press, so only preliminary results were known at the time. Afterwards, the analytical results were published with only the basic archaeological information.<sup>3</sup> In this paper, we would like to present

<sup>1</sup> Milavec 2009; 2011a; 2011b.

<sup>2</sup> Milavec 2015.

<sup>3</sup> Šmit et al. 2013.

the results in their archaeological context. These are the first archaeometric analyses done on late antique glass in Slovenia. Thus far, only samples of early Roman<sup>4</sup> and Early Medieval glass<sup>5</sup> have been analysed and published. Some analyses were made in 1998 on material from Kranj.<sup>6</sup>

### THE SITE

Tonovcov grad lies in the Soča River valley on a naturally well-protected location on the route between Italy and Noricum across the Predel pass. It was systematically excavated in 1993–2005 by a team from the Institute of Archaeology at the ZRC SAZU, led by Slavko Ciglencečki. The site was periodically settled in Prehistory, the early Roman and the early Medieval period but the main occupation phase begins in the late Roman period when the site most probably functioned within the *Claustra Alpium Iuliarum* defence system of Italy (phase Late Antiquity 1 or LA 1). This Late Roman phase is dated between the second half of the 4<sup>th</sup> and the third decade of the 5<sup>th</sup> c. AD and consists of traces of two buildings (remains of walls under late antique Building no. 1 and Building no. 3) and of typical militaria, coins etc. found in later layers. Late Roman layers and architecture were heavily damaged by the next building phase, which took place after a short period of disuse in the middle of the 5<sup>th</sup> c. AD. The Late Antiquity 2 (LA 2) phase is dated between the late 5<sup>th</sup> and the early 7<sup>th</sup> c. AD and represents the main occupation phase of the site. There was a large settlement with ca. 30 houses, a water cistern, defence walls and a complex of three churches on the highest plateau of the settlement (Fig. 1). The architecture and a large number of small finds suggest this was an important regional centre of the autochthonous population with a temporary presence of Germanic military elites of the time: the Eastern Goths and the Longobards.

Glass is mainly represented by fragments (fire-rounded rims and feet) of stemmed goblets made of naturally coloured green-yellow glass. Other than stemmed goblets, fragments of glass lamps and window glass, only a few other glass vessel types were found: beakers, bottles, bowls, balsamaria or smaller bottles, and a plate. Most of the glass was

found in and around Building no. 1 (118 diagnostic fragments); the assemblage consists mostly of drinking vessels: goblets, beakers, and bottles. Fragments of window panes indicate that House no. 1 had glazed windows in the LA 2 phase.<sup>7</sup> Houses nos. 2 and 3, the water cistern (Fig. 1: 5) and the ecclesiastical complex (Fig. 1: 4) revealed a significantly smaller number of glass vessels. In the ecclesiastical complex, window panes, hanging lamps, and small bottles or flasks were the most numerous glass finds. The vessels and lamps were found in two clusters: one behind the clergy bank in the main (middle of the three) church and the second along the passage from the main church into a small adjacent room, possibly a memorial chapel.<sup>8</sup> The function of the space that was cut into bedrock between the main and south church is not sufficiently explained. It was apparently empty while the churches were used, the layers of debris and the finds in it are connected to the gradual decay of ecclesiastical buildings.

### GLASS COMPOSITIONAL GROUPS AND WORKSHOPS

There is mounting evidence that in the early and middle Roman period, the primary production of glass (raw glass) was also taking place in the western part of the Empire;<sup>9</sup> however, for the time after the 3<sup>rd</sup> c. AD the only known primary workshops were situated in the East (Egypt and Syro-Palestine). Analyses in the last few decades have identified several different compositional groups of raw glass, characterized by specific traces of the sand source used for the production.<sup>10</sup> Some of them were linked with specific workshops (such as Levantine II group from Beit Eli'ezer) while others are expected to have come from a certain region, but the exact location has not yet been recognized (e.g. HIMT mass from Egypt). In the second half of the first millennium AD, the most common groups in the western and eastern parts of the Mediterranean are Levantine I and HIMT (high iron, manganese, and titanium). Levantine I was produced with the sand of the Syro-Palestinian coast between the 4<sup>th</sup>–9<sup>th</sup> c. AD, but was most

<sup>4</sup> Schwinger 1998 (in Lazar 2003, 241); Istenič, Šmit 2012; Jackson, Cottam, Lazar 2015.

<sup>5</sup> Šmit et al. 2009; 2012.

<sup>6</sup> Sagadin 2000, 18; 2004, 111.

<sup>7</sup> Milavec 2015, 82–85.

<sup>8</sup> Milavec 2011a, Fig. 3.2; 3.3; Milavec 2017, Fig. 4.

<sup>9</sup> Degryse, Schneider 2008.

<sup>10</sup> Freestone et al. 2000; Rehren, Cholakova 2010, 87–88, Tab. 2; Siu, Henderson, Faber 2017, 257.

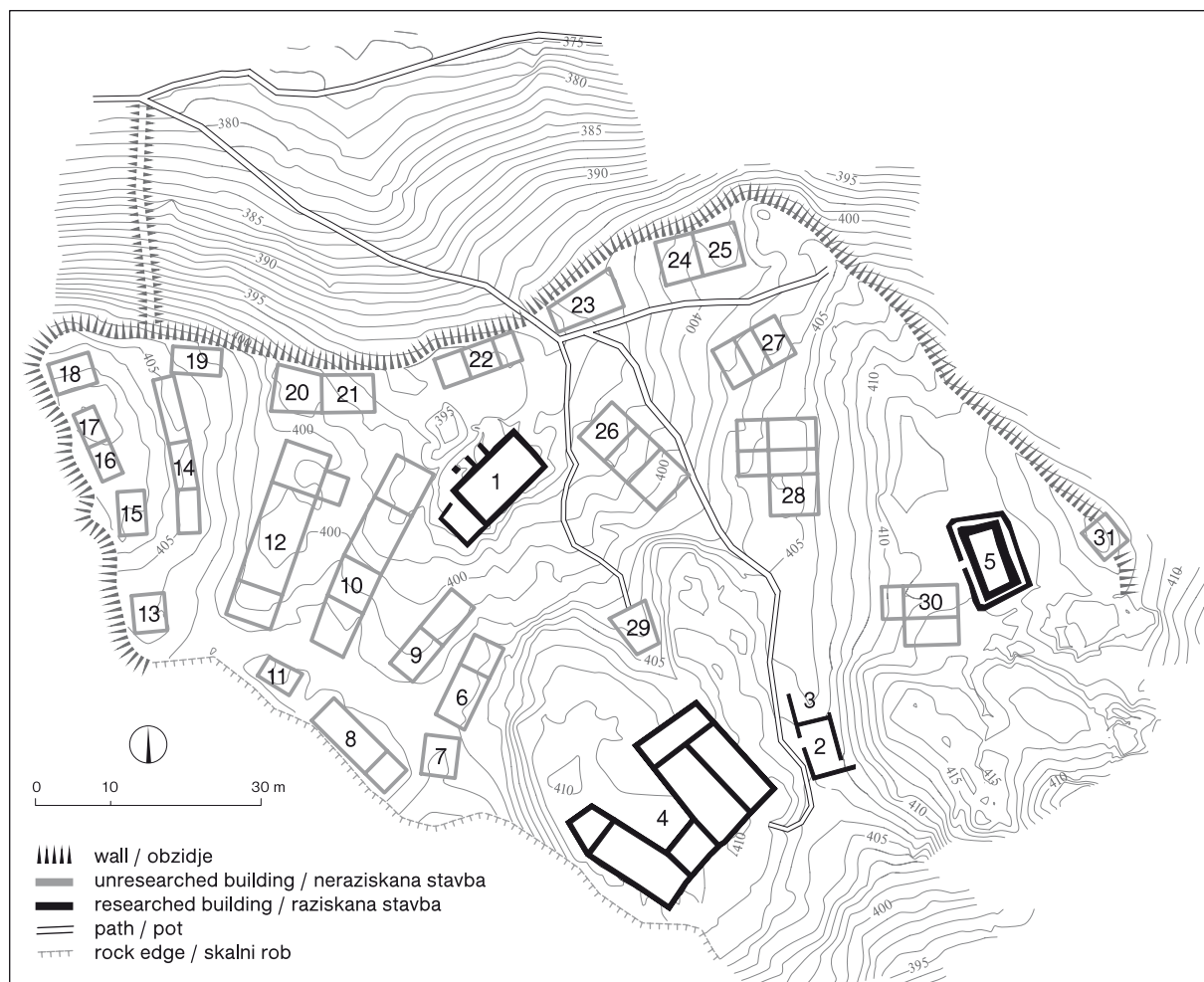


Fig. 1: Tonovcov grad, site plan (Ciglencečki et al. 2011, Fig. 1.7).  
 Sl. 1: Tonovcov grad, načrt najdišča (Ciglencečki et al. 2011, sl. 1.7).

popular between 5<sup>th</sup>–7<sup>th</sup> c. AD. HIMT was almost certainly produced in Egypt and circulated, above all, in the late 4<sup>th</sup> and 5<sup>th</sup> c. AD.<sup>11</sup> In the west it was widely used in Britain and also Italy.<sup>12</sup> Other groups, more common in the east, are Levantine II glass, which apparently succeeded the Levantine I production in the 7<sup>th</sup> and 8<sup>th</sup> c. AD at Beit Eli'ezer in Israel<sup>13</sup> and Egypt I and II compositional groups, which were probably produced in Egypt between 7<sup>th</sup>–9<sup>th</sup> c. AD.<sup>14</sup> Together with the new recipes, the Roman blue-green glass, typical during the 1<sup>st</sup>–3<sup>rd</sup> c. AD, was apparently still in use.<sup>15</sup>

Secondary production (vessels), which had been the domain of large production centres in the classical Roman times, was transferred to a larger number of small workshops throughout the Empire, which may only have supplied individual or a small number of settlements.<sup>16</sup> Consequently, trade in glass vessels, especially over long distances, was probably only limited to specific vessel types. In Slovenia no late antique glass workshops have been discovered thus far; the nearest can be found in northern Italy.<sup>17</sup> In Kranj in north-western Slovenia remains of plastered pits and deformed fragments of glass vessels were tentatively interpreted as a secondary glass workshop, but the arguments

<sup>11</sup> Nenna 2014; Schibille et al. 2016.

<sup>12</sup> Freestone, Wolf, Thirlwall 2005; Foster, Jackson 2009.

<sup>13</sup> Freestone et al. 2002.

<sup>14</sup> Gratuze, Barrandon 1990; Freestone et al. 2002; 2015; Phelps et al. 2016.

<sup>15</sup> Foster, Jackson 2009.

<sup>16</sup> Freestone et al. 2000; Whitehouse 2003; Lafli, Gürler 2010, 444.

<sup>17</sup> Sternini 1995, 267–268; Silvestri, Molin, Salviulo 2005, 811.

presented this far are inconclusive.<sup>18</sup> At Gradišče above Bašelj, chunks of raw glass were discovered: six of them in the early Medieval layer.<sup>19</sup>

### ANALYSES AND COMPOSITIONAL GROUPS OF TONOVCOV GRAD GLASS

Thirty-nine fragments of glass vessels, a window pane, and three glass beads (*Pls. 1; 2* – plus 2 fragments not represented: a vessel wall and window pane) were chosen for analysis with the aim of covering all the periods (Early Roman, LA 1 and 2, Early Medieval), the buildings (Houses nos. 1, 2 and 3, church complex and the space in-between) and typological groups (beakers, goblets, lamps, bottles, a balsamarium, etc.). The issues we were interested in were: a) compositional groups, b) possible connection of compositional groups with settlement phasing and vessel typology and c) degree of recycling detected. Two glass beads (*Pl. 2: 11,14*) have no useful stratigraphic or typological data, and we hoped to gain some idea about their origin from their composition.

The samples were analysed by Žiga Šmit and Helena Fajfar using combined PIXE-PIGE (particle-induced X-ray and gamma-ray emission) method at the Jožef Stefan Institute in Ljubljana, Slovenia. Ten samples were additionally analysed by James W. Lankton and Bernard Gratuze using LA ICP MS (inductively coupled plasma mass spectrometry) at the University College of London Institute of Archaeology and the IRAMAT-Centre Ernest-Babelon at CNRS in Orléans, France.<sup>20</sup>

### Results

(*Fig. 2*)

A number of different glass compositions were identified. The largest number of samples belongs to the Levantine I; a smaller group shows similarities to the Roman blue-green and three samples to the HIMT composition type. A group of four samples could perhaps be interpreted as RBG glass recycled with HIMT, and two fragments have a composition similar to Levantine II.<sup>21</sup> A dark

blue glass bead (*Pl. 2: 15*) was made using the ash of halophytic plants as flux; all others are other natron glass types.

This variety of compositional groups (assuming that the identification of RBG and Levantine II is correct) came as a surprise. Analyses from various contemporary Italian sites usually showed fewer groups, typically HIMT or Levantine I, or both. At the Casa delle bestie ferite and at the Domus of Tito Macro in Aquileia there was mostly HIMT, with some Levantine I and some so-called Série 3.2 glass (a similar composition defined by D. Foy and colleagues).<sup>22</sup> From Grado,<sup>23</sup> the so-called villa of Theoderic at Galeata, Emilia Romagna<sup>24</sup> and San Genesio in Tuscany,<sup>25</sup> only HIMT was reported. In the south, at Herdonia,<sup>26</sup> Faragola,<sup>27</sup> Napoli<sup>28</sup> and at Ganzirri, Sicily,<sup>29</sup> HIMT and Levantine I were used. At the site nearest to Tonovcov grad, San Martino di Ovaro in Carnia, only Levantine I composition was found.<sup>30</sup> Analyses made for Classe, Ravenna showed Série 3.2 and HIMT and to a lesser extent Levantine I compositions.<sup>31</sup>

Glass compositions changed slightly through time, probably as the workshops' locations shifted and the sand they used was slightly different. Several authors recognized varieties of the HIMT group. The three Tonovcov grad pieces (*Pl. 1: 2,3,14*) could be compared to the so-called "strong" HIMT glass mass which was used in the 5<sup>th</sup> c. AD. Later variants of HIMT are described as "weaker" as the glass was probably recycled, and the composition diluted.<sup>32</sup> Gliozzo et al. included the three Tonovcov grad HIMT fragments in a group of Ca-rich HIMT samples, which are concentrated around the Adriatic between the 4<sup>th</sup>–7<sup>th</sup> c. AD.<sup>33</sup>

A group of 11 vessels was made of Roman blue-green glass mass (*Pl. 1: 1,6,16,19,21,23; 2: 8,11,12,16; one not drawn*). Two of them are also

<sup>18</sup> Sagadin 2000; 2004; cf. Lazar 2003, 78–79, 217–218.

<sup>19</sup> Sagadin 2000; 2004; cf. Lazar 2003, 78–79, 217–218.

<sup>20</sup> Šmit et al. 2013, 53–54.

<sup>21</sup> Noted by Th. Rehren and not included in the Šmit et al. 2013 paper.

<sup>22</sup> Gallo et al. 2014; Maltoni et al. 2016.

<sup>23</sup> Silvestri, Molin, Salviulo 2005.

<sup>24</sup> Arletti et al. 2010a.

<sup>25</sup> Cagno et al. 2012.

<sup>26</sup> Gliozzo et al. 2016a.

<sup>27</sup> Gliozzo et al. 2016b.

<sup>28</sup> Piazza Bovio; De Francesco et al. 2014. Also another, as yet undefined group of colourless glass was recognized at the site.

<sup>29</sup> Arletti et al. 2010b.

<sup>30</sup> Zucchiati et al. 2007.

<sup>31</sup> Maltoni et al. 2015.

<sup>32</sup> Foy et al. 2003; Foster, Jackson 2009, 192–193; Gallo et al. 2014, 15–17.

<sup>33</sup> Gliozzo et al. 2016a, 98–105.

Drawing (Pl.)	Sample	Datation (Century)	Building	Settlement Phase	Colour	Group
I: 4	rim	?	1	-	greenish	Lev I
I: 5	fire-rounded rim	5 <sup>th</sup> -7 <sup>th</sup>	1	mixed	greenish	Lev I
I: 7	fire-rounded rim	5 <sup>th</sup> -7 <sup>th</sup>	1	LA 2	greenish	Lev I
I: 8	fire-rounded rim	5 <sup>th</sup> -7 <sup>th</sup>	1	LA 2	green	Lev I
I: 9	fire-rounded rim	5 <sup>th</sup> -7 <sup>th</sup>	2	-	greenish	Lev I
I: 10	fire-rounded rim	5 <sup>th</sup> -7 <sup>th</sup>	3	LA 2	greenish	Lev I
I: 11	fire-rounded rim	5 <sup>th</sup> -7 <sup>th</sup>	3	mixed	yellowish	Lev I
I: 12	fire-rounded rim	5 <sup>th</sup> -7 <sup>th</sup>	Main church	destruction of LA 2	yellow	Lev I
I: 13	fire-rounded rim	5 <sup>th</sup> -7 <sup>th</sup>	Main church	destruction of LA 2	greenish	Lev I
I: 15	beaker base	4 <sup>th</sup> -5 <sup>th</sup>	1	LA 1	green	Lev I
I: 17	beaker base	4 <sup>th</sup> -5 <sup>th</sup>	Main church	LA 2	greenish	Lev I
I: 18	beaker base	4 <sup>th</sup> -5 <sup>th</sup>	Memoria	destruction of LA 2	light blue	Lev I
I: 20	beaker foot	5 <sup>th</sup>	1	LA 2	yellow-green	Lev I
I: 22	goblet foot	late 5 <sup>th</sup> -7 <sup>th</sup>	1	LA 2	green	Lev I
I: 24	goblet foot	late 5 <sup>th</sup> -7 <sup>th</sup>	1	-	yellow	Lev I
2: 1	goblet foot	late 5 <sup>th</sup> -7 <sup>th</sup>	2	LA 2	green	Lev I
2: 2	goblet foot	late 5 <sup>th</sup> -7 <sup>th</sup>	3	LA 2	greenish	Lev I
2: 3	goblet foot	late 5 <sup>th</sup> -7 <sup>th</sup>	North church (under narthex)	LA 2	yellowish	Lev I
2: 4	goblet foot	late 5 <sup>th</sup> -7 <sup>th</sup>	Memoria	destruction of LA 2	greenish	Lev I
2: 5	lamp	5 <sup>th</sup> -7 <sup>th</sup>	Main church	LA 2	greenish	Lev I
2: 6	lamp	5 <sup>th</sup> -7 <sup>th</sup>	Main church	LA 2	green	Lev I
2: 7	lamp	5 <sup>th</sup> -7 <sup>th</sup>	1	LA 2	yellowish	Lev I
2: 9	balsamarium base	5 <sup>th</sup> -7 <sup>th</sup> ?	1	LA 2	yellow-green	Lev I
2: 10	vessel wall	5 <sup>th</sup> -6 <sup>th</sup> ?	1	mixed	greenish	Lev I
2: 13	bottle neck	4 <sup>th</sup> -7 <sup>th</sup> ?	1	mixed	green	Lev I
-	window glass	5 <sup>th</sup> -7 <sup>th</sup>	1	LA 2	brownish	Lev I
I: 1	beaker rim	1 <sup>st</sup>	1	-	blue	ER
-	vessel wall	Early Roman	1	LA 2	blue	ER
I: 6	fire-rounded rim	5 <sup>th</sup> -7 <sup>th</sup>	1	LA 2	greenish	RBG?
I: 16	beaker base	4 <sup>th</sup> -early 5 <sup>th</sup>	1	LA 1	green	RBG?
I: 19	beaker foot	5 <sup>th</sup>	1	LA 2	greenish	RBG?
I: 21	beaker foot	5 <sup>th</sup>	space between churches	destruction of LA 2?	colourless	RBG?
I: 23	goblet foot	late 5 <sup>th</sup> -7 <sup>th</sup>	1	LA 2	light blue	RBG?
2: 8	handle	5 <sup>th</sup> -7 <sup>th</sup> ?	1	-	green	RBG?
2: 11	four-partite bead	?	space between churches	destruction of LA 2?	blue, red	RBG?
2: 12	bottle rim	4 <sup>th</sup> -7 <sup>th</sup> ?	1	LA 2	green	RBG?
2: 16	bowl rim Foy 21a	5 <sup>th</sup> -6 <sup>th</sup>	1	LA 2	colourless	RBG?
I: 2	cut rim	4 <sup>th</sup> -early 5 <sup>th</sup>	North church (under narthex)	LA 2	green	HIMT
I: 3	cut rim	4 <sup>th</sup> -early 5 <sup>th</sup>	space between churches	destruction of LA 2	greenish	HIMT
I: 14	beaker base	4 <sup>th</sup> -early 5 <sup>th</sup>	1	-	olive green	HIMT
2: 14	tubular bead	?	space between churches	destruction of LA 2?	red	Lev II?
2: 17	plate	5 <sup>th</sup> -7 <sup>th</sup> ?	1	LA 2	green	Lev II?
2: 15	segmented bead	8 <sup>th</sup> -9 <sup>th</sup>	1	EMA	blue	plant ash

Fig. 2: Tonovcov grad, analysed glass samples. The identifications of compositional groups by Ž. Šmit and Th. Rehren. **LA 1** = Late Antique phase 1; **LA 2** = Late Antique phase 2; **Lev I** = Levantine I; **Lev II** = Levantine II; **ER** = Early Roman; **RBG** = Roman blue-green; **HIMT** = high iron, manganese and titanium

Sl. 2: Tonovcov grad, analizirani vzorci stekla ... (glej slovensko besedilo).

typologically early Roman vessels (*Pl. 1: 1*; blue vessel wall not drawn), and their composition is quite distinct from the other nine typologically later samples. Four fragments (*Pl. 1: 16; 2: 8,11,13*) showed elevated values of titania, which could be explained as traces of recycling with HIMT mass during secondary production, but it could also mean that the glass was produced from a slightly different sand.

HIMT was apparently easier to work than Levantine glass since due to its higher soda content lower melting temperatures were needed, but it was made of lower quality sand. This made it cheaper than the higher quality Levantine glass and it probably also explains its wide popularity in the 4<sup>th</sup> and 5<sup>th</sup> c. AD.<sup>34</sup> In the 7<sup>th</sup> and 8<sup>th</sup> c. AD, when natron supply seems to have become limited and more expensive outside Egypt, it would have become more expensive.<sup>35</sup>

The colour of the glass could sometimes be directly linked to the composition,<sup>36</sup> but not as a rule.<sup>37</sup> Among the analysed samples at Tonovcov grad, only the early Roman vessels and beads were intentionally coloured. The RBG group includes two colourless fragments and a light blue one; the others are green. All the HIMT and almost all Levantine I fragments are in shades from yellow to green, sometimes brownish. One Levantine I piece is light blue.

### Vessel typology vs glass composition

Attempts to correlate vessel types and their primary compositions to see if the glass mass in any way influenced the type of objects produced with it have thus far not been numerous.<sup>38</sup> Those who have tried do not yet report very promising results, but further research is forthcoming. In Aquileia and Classe, Ravenna, no apparent correlation between composition and vessels could be established; only a tentative connection between a type of bottles and HIMT glass at the site of

Casa dele bestie ferite in Aquileia was made.<sup>39</sup> At Herdonia, they were able to correlate some vessel types to HIMT glass.<sup>40</sup>

At Tonovcov grad, the following groups of glass objects were analysed: cut rims, fire-rounded rims, beaker bases, beaker feet, goblet stems, bottle rim and neck, balsarium bases, plate foot, bowl rim, lamps with handles, vessel wall fragment, beads, and window pane (*Pls. 1; 2*). Two fragments belong to early Roman vessels: an Isings 12 beaker and an unidentified blue vessel wall (*Pl. 1: 1*; blue vessel wall not drawn). As expected, their glass composition differs considerably from the later ones and is typical for 1<sup>st</sup>–3<sup>rd</sup> c. AD.

Cut rims and beaker bases belong to beaker types Isings 106 and 109 (*Pl. 1: 2,3,14–18*), which are usually dated to the 4<sup>th</sup>–5<sup>th</sup> c. AD, but they also appear later, especially Is 106.<sup>41</sup> The two analysed cut rims were made of HIMT glass, as was one of the bases. Three bases show Levantine I and one RBG composition.

Footed beakers (*Pl. 1: 19–21*) are usually dated to the 5<sup>th</sup> c. AD and are more characteristic of late Roman than late antique assemblages.<sup>42</sup> At Tonovcov grad, two were made of RBG and one of Levantine I glass.

Stemmed goblets (*Pl. 1: 22–24; 2: 1–4*) are the most common vessel type in the late antique Mediterranean from the late 5<sup>th</sup> c. AD onwards.<sup>43</sup> Except one, they were all made using Levantine I glass mass. A light blue, slightly larger example (*Pl. 1: 23*) was made of RBG glass. On Tonovcov grad, it is significant to note that no goblet feet or stems appear in LA 1 layers and only one Levantine I vessel (a beaker base, *Pl. 1: 15*) was found in an LA 1 layer. Since the Levantine I group was used – if not common – in the late 4<sup>th</sup> c. AD,<sup>44</sup> this does not contradict Tonovcov grad phasing.

All three analysed lamps with handles (*Pl. 2: 5–7*) were made of Levantine I mass, impurities in the glass even indicate that they could have been made from the same batch of glass.<sup>45</sup> Also of Levantine I composition were the window pane fragment (not drawn) and the balsarium base (*Pl. 2: 9*), found in an LA 2 layer. The bottle rim

<sup>34</sup> Foster, Jackson 2009; Gallo et al. 2014, 17; Nenna 2014, 186.

<sup>35</sup> Freestone et al. 2015.

<sup>36</sup> In Aquileia and Carthage Levantine I glass has an aqua shade while HIMT is yellow-green: Gallo et al. 2014, 15; Siu, Henderson, Faber 2017, 269. Also Phelps et al. 2016, 66.

<sup>37</sup> Nenna 2014, 186.

<sup>38</sup> For early Roman emerald green glass see Jackson, Cottam, Lazar 2015.

<sup>39</sup> Gallo et al. 2014, 16, Fig. 9; Maltoni et al. 2015, 15.

<sup>40</sup> Gliozzo et al. 2016a, 106.

<sup>41</sup> Milavec 2011a, 86; Gallo et al. 2014, Tab. 2.

<sup>42</sup> Milavec 2011a, 85.

<sup>43</sup> Milavec 2011a, 84–85.

<sup>44</sup> Freestone, Wolf, Thirlwall 2005.

<sup>45</sup> Smit et al. 2013, 58.

and neck fragments (*Pl. 2: 12,13*) were made of RBG and Levantine I glass, respectively.

A plate foot (*Pl. 2: 17*) is very interesting as its composition is very similar to Levantine II group which was produced between the 7<sup>th</sup> and 8<sup>th</sup> c. AD at Beit Eli'ezer.<sup>46</sup> Also, open vessels are not common outside the eastern Mediterranean in late antiquity, especially in the hinterland. Since there is one fragment in this case only the vessel can have been brought to the site, not necessarily raw glass. A small red tubular bead (*Pl. 2: 14*) shows a very similar composition, but neither its form nor context (see below) give any additional information. The four-partite dark blue bead with a red wavy line (*Pl. 2: 11*) was found together with the small red one in gravel layers filling the space between churches and was made of RBG glass. The beads could not be ascribed to any phase of the settlement. Their composition shows they were made of natron glass of similar compositions as some vessels at the site, so they can probably be linked to the late antique phase of the settlement, though later remelting and reuse cannot be excluded.<sup>47</sup> The segmented blue bead (*Pl. 2: 15*), which was found in an early Medieval layer, belongs to the popular group of beads, which were imported to Europe around 800 AD from the eastern Mediterranean.<sup>48</sup> The analyses confirmed it was made of plant-ash glass.

## CONCLUSIONS

First, it must be pointed out that all conclusions must necessarily remain hypothetical until more analyses are made on late antique glass in the region. The samples discussed here are relatively small for most compositional groups and the results, though exciting, must be viewed with caution.

The late Roman (LA 1) layers at Tonovcov grad were not very well preserved due to later activities at the site, and the small finds from these layers were few. A relatively large number of typically late Roman finds were, in contrast, discovered in later, LA 2, mixed and destruction layers but again, there were few typical late Roman glass vessels. Despite the presumed military importance of Tonovcov grad in the late Roman period, there was only one

small fragment of a *Nuppenbecher*,<sup>49</sup> which usually abound on such sites. This could be explained by the assumption that the late Roman military peak of the post belongs to a time when regular state supply was not readily available or was limited to other products.<sup>50</sup> Only two of the fragments analysed originated from undisturbed LA 1 layers, these are two beaker bases of Levantine I and RBG (mixed with HIMT?) compositions (*Pl. 1: 15,16*), so it seems both glass types were available at the time. That is understandable, because RBG and Levantine I also circulated as early as in the 4<sup>th</sup> c. AD, even if they achieved their greatest popularity in the following centuries. Two glass vessels, a HIMT cut rim (*Pl. 1: 2*) and a Levantine I goblet foot (*Pl. 2: 3*), came from a layer under the narthex of the north church which places them before or to the time of construction of the narthex if not also of the churches.

Looking at the finds from a typological point of view, two late Roman cut rims and a beaker base (*Pl. 1: 2,3,14*) were made with HIMT glass. One of the rims was found in a layer beneath the narthex of the north church as just mentioned, the other in a destruction layer (*Pl. 1: 3*), and for the base (*Pl. 1: 14*) there was no data. There is a very small number of cut rims at the site, so it is probable they were not used in the LA 2 phase from which the large number of fire-rounded rims originates. This is not so easy to assume for the bases as beakers obviously continued to be produced after the first half of the 5<sup>th</sup> c. AD, but with different rims.

From LA 2 layers there are mostly vessels of the Levantine I group. The fragment of the early Roman vessel wall is obviously residual, while the probably Levantine II plate fragment (*Pl. 2: 17*) is an intriguing piece which, if the identification is correct, would mean a relatively late supply of raw glass or vessels to the site. The red bead (*Pl. 2: 14*) with a similar composition was found in a destruction layer. The RBG vessel fragments from LA 2 layers are a mixed collection of vessel types that do not appear in large numbers at the site and most of them would be more easily dated into the 5<sup>th</sup> than the 6<sup>th</sup> c. AD. It is thus far impossible to say whether they are residual or contemporary finds in the mostly 6<sup>th</sup> c. AD layers.

The goblets, lamps, and window glass represent typical late antique assemblage. With the excep-

<sup>46</sup> Freestone, Wolf, Thirlwall 2005; Freestone et al. 2015.

<sup>47</sup> Early Medieval working of Roman glass is documented at Gradišče above Bašelj: Šmit et al. 2009; Knific, Šmit 2018.

<sup>48</sup> Greiff, Nallbani 2008, 367

<sup>49</sup> Milavec 2011a, Pl. 54: 5.

<sup>50</sup> Ciglencečki, Milavec 2009.

tion of a foot which lay under the narthex (see above), almost all of them were found in LA 2 or later destruction layers, and almost all were made of Levantine I glass (all goblet feet but one, all the lamps, the one window pane and also all fire-rounded rims but one).

A group of 10 vessels showed a composition similar to Roman blue-green glass, which thus far has not been detected among other analysed sites in the vicinity. The vessels in this group are typologically not as late as Levantine I ones; they are mostly characteristic 5<sup>th</sup> c. AD vessels such as footed beakers, a bottle, and a bowl. Of the later forms, there is only one stemmed goblet foot in the group, which differs from all other feet at the site in size and colour (*Pl. 1: 23*). They may represent an earlier group in comparison to the Levantine I ones, but not necessarily. If the assumption that a part of them was recycled with HIMT glass is correct, it would mean the two groups were available simultaneously.

With caution, some correlation could be seen between the typology and the compositional groups. Typologically earlier pieces are often made of generally earlier raw glass and are found in earlier layers, though they are also present in later ones. As a discontinuation of settlement on the site is presumed in the second half of the 5<sup>th</sup> c. AD, this would indicate a secondary position of the finds and not a longer use or reuse of the vessels themselves.

The segmented blue bead (*Pl. 2: 15*), which was found in an Early Medieval layer and is typologically

dated from the second half of the 8<sup>th</sup> to the early 9<sup>th</sup> c. AD, was made of plant ash glass and is the remnant of another period of trade with the East which is scarcely represented on Slovenian early Medieval sites. In this case, the trade in beads is represented, not in raw glass. The new information on the presence of glass objects in early Medieval Moravia<sup>51</sup> and the results of analyses of glass at other Slovenian early Medieval sites<sup>52</sup> will perhaps start breaking the myths of the inexistence of production and use of glass in the early Medieval Slavic regions. At Tonovcov grad, no vessels belonging to the early Medieval period were found so far.

Traces of recycling were few, which was surprising. The autarkic character of the late antique settlements in the south-eastern Alpine region is often emphasized, and the long-distance trade detected almost only by the presence of pottery containers. This analysis showed that at least to some degree the site was included in the wide and colourful Mediterranean raw glass network. The workshop(s) which supplied it could obtain chunks of different raw glass from Egypt or Syro-Palestine, perhaps as late as early 7<sup>th</sup> c. AD. The quantity of finds from late Roman layers at the site and indeed the whole sample analysed is not large enough to allow us to see how many glass masses were used simultaneously. As pointed out above, the site does not seem to have been abundantly supplied with glass in the late 4<sup>th</sup> and early 5<sup>th</sup> c. AD.

<sup>51</sup> Sedlačková 2006; Galuška et al. 2012.

<sup>52</sup> Šmit et al. 2009; Knific, Šmit 2018.

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## Analize poznoantičnega stekla s Tonovcovega gradu pri Kobaridu v arheološkem kontekstu

### UVOD

Steklo s Tonovcovega gradu pri Kobaridu je bilo predstavljeno v nekaj člankih in v drugi knjigi monografske objave najdišča skupaj z drugimi drobnimi najdbami ter v poglavju o poznoantičnem steklu v Sloveniji.<sup>1</sup> Kasneje je bilo posebej objavljeno še okensko steklo iz naselbine.<sup>2</sup> Med obravnavo steklenih najdb so bile opravljene arheometrične analize na 43 odlomkih. Te ob izidu monografske objave še niso bile zaključene, zato so bili takrat znani le predhodni rezultati. Zatem so bili objavljeni rezultati analiz z najosnovnejšimi arheološkimi podatki.<sup>3</sup> Na tem mestu želimo predstaviti rezultate v njihovem arheološkem kontekstu.

To so prve arheometrične analize poznoantičnega stekla v Sloveniji. Do sedaj je bilo temeljiteje

analizirano in objavljeno le zgodnjersko<sup>4</sup> in zgodnjersrednjeveško steklo.<sup>5</sup> Manjše analize so bile opravljene leta 1998 na kranjskem gradu.<sup>6</sup>

### NAJDIŠČE

Tonovcov grad leži v dolini reke Soče na naravno dobro zavarovani točki nad cestno povezavo med Italijo in Norikom čez prelaz Predel. Sistematična izkopavanja ekipe Inštituta za arheologijo ZRC SAZU pod vodstvom Slavka Ciglencekega so potekala med letoma 1993 in 2005. Najdišče je bilo občasno poseljeno v prazgodovini, zgodnjerskem in zgodnjersrednjeveškem obdobju, glavna naseljitvena faza se začne v poznorskim obdobju,

<sup>1</sup> Milavec 2009; 2011a; 2011b.

<sup>2</sup> Milavec 2015.

<sup>3</sup> Šmit et al. 2013.

<sup>4</sup> Schwinger 1998 (navedba po Lazar 2003, 241); Istenič, Šmit 2012; Jackson, Cottam, Lazar 2015.

<sup>5</sup> Šmit et al. 2009; 2012.

<sup>6</sup> Sagadin 2000, 18; 2004, 111.

ko je postojanka najverjetneje delovala v sklopu sistema *claustra Alpium Iuliarum* (poznoantična faza 1 ali PA 1). Ta faza je datirana v obdobje med drugo polovico 4. st. in tretje desetletje 5. st., predstavljajo pa jo sledovi dveh stavb (ostanki zidov pod poznoantično stavbo 1 in stavba 3) ter značilni deli moške noše in novci, najdeni v kasnejših plasteh. Poznorimske plasti in arhitektura so bile močno poškodovane med drugo gradbeno fazo, ki je sledila po kratkem obdobju opustitve v sredini in drugi polovici 5. st. Poznoantična faza 2 (PA 2) je datirana med pozno 5. in zgodnje 7. st. in pomeni glavno poselitveno fazo najdišča. Na hribu je stala velika naselbina s približno 30 hišami, vodnim zbiralnikom, obrambnim obzidjem in sklopom treh cerkva na najvišjem platoju (*sl. 1*). Arhitektura in velika količina drobnega gradiva kažeta, da je bilo to pomembno regionalno središče staroselskega prebivalstva z začasno prisotnostjo trenutnih germanskih vojaških elit, Vzhodnih Gotov in Langobardov.

Steklene najdbe večinoma zastopajo odlomki (zataljena ustja in noge) kozarcev na visoki nogi, narejeni iz naravno obarvanega zelenorumenega stekla. Poleg kozarcev na visoki nogi so bili odkriti še odlomki steklenih svetilk, okenskega stekla in nekaj drugih oblik: kozarci brez noge, steklenice, skleda, balzamariji ali manjše stekleničke in krožnik. Večina stekla je bila najdena v hiši 1 in okrog nje (118 diagnostičnih kosov), gre večinoma za pivsko posodje: kozarci na nogi in brez nje ter steklenice. Odlomki okenskega stekla kažejo, da je imela hiša 1 zastekljene okenske odprtine v fazi PA 2.<sup>7</sup> V stavbah 2 in 3, vodnem zbiralniku (*sl. 1:5*) in cerkvenem sklopu (*sl. 1: 4*) je bilo najdenih bistveno manj steklenih posod. V cerkvenem sklopu so bili najštevilnejši odlomki okenskega stekla, visečih svetilk in majhnih stekleničk. Posode in svetilke so ležale v dveh skupkih, eden za klopjo za duhovščino v osrednji (srednja od treh) cerkvi in drugi ob prehodu med osrednjo cerkvijo v majhen sosednji prostor, morda spominsko kapelo.<sup>8</sup> Uporaba prostora, vsekanega v živo skalo med osrednjo in južno cerkvijo, ni zadovoljivo pojasnjena. Medtem ko so bile cerkve v uporabi, je bil očitno prazen, saj so plasti ruševin in najdbe v njem povezane s postopnim propadom cerkvenih stavb.

<sup>7</sup> Milavec 2015, 97–98.

<sup>8</sup> Milavec 2011a, sl. 3.2 in 3.3; Milavec 2017, sl. 4.

## SKUPINE SUROVEGA STEKLA IN DELAVNICE

Sicer je vse več dokazov, da so v zgodnje- in srednjerimskem obdobju surovo steklo izdelovali tudi v zahodnem delu imperija,<sup>9</sup> vendar so za čas po 3. st. edine znane primarne delavnice na vzhodu (Egipt ter Sirija in Palestina). V zadnjih nekaj desetletjih so z analizami prepoznali veliko različnih skupin surovega stekla, ki jih označujejo sledovi izvora peska, uporabljenega pri proizvodnji.<sup>10</sup> Nekatere mase so povezali s posameznimi delavnicami (npr. masa Levantine II in Beit Eli'ezer), za druge predvidevajo, da prihajajo iz določenega predela, vendar natančna lokacija ni znana (npr. masa HIMT iz Egipta). V drugi polovici prvega tisočletja sta najpogostejši skupini na obeh straneh Sredozemlja Levantine I in HIMT. Levantine I je bila narejena s peskom z obal Sirije in Palestine med 4. in 9. st., najbolj priljubljena je bila med 5. in 7. st. Maso HIMT (skrajšano od "high iron, manganese and titanium", kar pomeni visoke vrednosti železa, mangana in titana) so skoraj gotovo proizvajali v Egiptu in je krožila predvsem v poznem 4. in 5. st.<sup>11</sup> V zahodnem delu so jo pogosto uporabljali v Britaniji in tudi Italiji.<sup>12</sup> Druge skupine, pogostejše na vzhodu, so Levantine II, ki je očitno nasledila Levantine I v 7. in 8. st. v Beit Eli'ezerju v Izraelu,<sup>13</sup> in Egipt I in II, ki so ju verjetno izdelovali v Egiptu med 7. in 9. st.<sup>14</sup> Skupaj z novimi recepti je bilo očitno še vedno v uporabi rimsko modrozeleno steklo, sicer značilno za obdobje 1.–3. st.<sup>15</sup>

Sekundarna proizvodnja (posode), ki je bila v zgodnjem obdobju v celotnem imperiju v rokah velikih produkcijskih centrov, se je preselila v več manjših delavnic, ki so lahko zalagale posamezne ali manjše število naselbin.<sup>16</sup> Zato je bilo trgovanje s steklenimi posodami, posebno na dolge razdalje, omejeno le na posamezne vrste posodja. V Sloveniji do sedaj niso odkrili poznoantičnih steklarskih

<sup>9</sup> Degryse, Schneider 2008.

<sup>10</sup> Freestone et al. 2000; Rehren, Cholakova 2010, 87–88, tab. 2; Siu, Henderson, Faber 2017, 257.

<sup>11</sup> Nenna 2014; Schibille et al. 2016.

<sup>12</sup> Freestone, Wolf, Thirlwall 2005; Foster, Jackson 2009.

<sup>13</sup> Freestone et al. 2002.

<sup>14</sup> Gratuze, Barrandon 1990; Freestone et al. 2002; 2015; Phelps et al. 2016.

<sup>15</sup> Foster, Jackson 2009.

<sup>16</sup> Freestone et al. 2000; Whitehouse 2003; Lafli, Gürlér 2010, 444.

delavnic, najbližje so najdene v Italiji.<sup>17</sup> V Kranju v severozahodni Sloveniji so bili odkriti ostanki ometanih jam in deformiranih odlomkov steklenih posod, previdno interpretirani kot sekundarna delavnica, vendar predstavljeni argumenti ne zadoščajo za to razlago.<sup>18</sup> Na Gradišču nad Bašljem so bili odkriti stekleni surovci, od tega jih je šest iz zgodnjeresrednjeveške plasti.<sup>19</sup>

## ANALIZE IN SKUPINE STEKLA S TONOVCOVEGA GRADU

Devetintrideset odlomkov steklenih posod, kos okenskega stekla in tri jagode (*t. 1; 2; - 2* kosa nista risana: ostenje posode in okensko steklo) smo izbrali za analizo z namenom pokriti vse faze naselbine (zgodnjeresrednja, PA 1 in PA 2, zgodnjeresrednjeveška), vse stavbe (stavbe 1, 2 in 3, sklop cerkva in prostor med cerkvami) in vse tipološke oblike (kozarci z nogo in brez nje, svetilke, steklenice, balzamariji itd.). Zanimalo nas je: a) skupine surovega stekla, b) možne povezave med skupinami stekla, fazami naselbine in tipologijo posod in c) zaznana stopnja recikliranja stekla. Dve jagodi (*t. 2: 11,14*) nimata dobrih stratigrafskih ali tipoloških opredelitev, upali smo, da bodo analize dale kakšen namig o njunem izvoru iz sestave.

Vzorci sta analizirala Ž. Šmit in H. Fajfar s kombinirano metodo PIXE-PIGE (kombinirana metoda protonsko vzbujenih rentgenskih žarkov in žarkov gama) na Institutu Jožefa Stefana v Ljubljani. Deset vzorcev sta dodatno analizirala J. W. Lankton in B. Gratuze z metodo LA ICP MS (masna spektroskopija z induktivno sklopljeno plazmo) na University College of London Institute of Archaeology in IRAMAT-Centre Ernest-Babelon na CNRS v Orléansu.<sup>20</sup>

### Rezultati

(*sl. 2*)

Prepoznano je bilo nekaj različnih skupin surovega stekla. Največ vzorcev pripada skupini Levantine I, manjše število kaže podobnosti z rimskim modro-zelenim steklom (Roman blue-

green ali RBG) in trije vzorci spadajo v skupino stekla HIMT. Skupino 4 vzorcev bi lahko morda interpretirali kot steklo RBG, reciklirano s HIMT, sestava dveh kosov pa je podobna masi Levantine II.<sup>21</sup> Temnomodra steklena jagoda (*t. 2: 15*) je bila narejena iz halofitskega, ostali kosi so iz natronskega stekla.

Raznolikost skupin steklenih mas (če je identifikacija RBG in Levantine II pravilna) je bila presenečenje. Analize s sočasnih italijanskih najdišč večinoma kažejo manj skupin, največkrat HIMT ali Levantine I, ali obe. V *Casa delle bestie ferite* in *Domus Tita Makra* v Akvileji je bil prepoznan večinoma HIMT z nekaj Levantine I in nekaj tako imenovanega stekla Série 3.2 (podobna skupina kot Levantine I, ki so jo prepoznali D. Foy in sodelavci).<sup>22</sup> Iz Gradeža,<sup>23</sup> tako imenovane Teoderikove vile v Galeati, Emilija Romanja,<sup>24</sup> in San Genesia v Toskani<sup>25</sup> je sporočeno le steklo HIMT. Na jugu Italije, v Herdoniji,<sup>26</sup> Faragoli,<sup>27</sup> Neaplju<sup>28</sup> in Ganzirri na Siciliji<sup>29</sup> so uporabljali HIMT in Levantine I. Na Tonovcovemu gradu najbližjem najdišču, San Martino di Ovaro v Karniji, so našli le steklo Levantine I.<sup>30</sup> Analize, delane za *Classe*, Ravena, so pokazale Série 3.2 in steklo HIMT ter v manjši meri Levantine I.<sup>31</sup>

Sestava steklenih mas se je skozi čas rahlo spreminjala, verjetno s tem, ko so se premikale lokacije delavnic in so uporabljali rahlo drugačen pesek. Več avtorjev je prepoznalo variante skupine HIMT. Tri odlomke s Tonovcovega gradu (*t. 1: 2,3,14*) bi lahko primerjali s tako imenovanim močnim HIMT, ki so ga uporabljali v 5. st. Kasnejše variante stekla HIMT so opisane kot "šibkejše", saj se je z recikliranjem skozi čas sestava mase redčila.<sup>32</sup> E. Gliozzo in sodelavci so tonovške tri kose HIMT uvrstili v podskupino HIMT, bogato s kalcijem in

<sup>21</sup> To je opazil Th. Rehren, v članku Šmit et al. 2013 ni bilo omenjeno.

<sup>22</sup> Gallo et al. 2014; Maltoni et al. 2016.

<sup>23</sup> Silvestri, Molin, Salviulo 2005.

<sup>24</sup> Arletti et al. 2010a.

<sup>25</sup> Cagno et al. 2012.

<sup>26</sup> Gliozzo et al. 2016a.

<sup>27</sup> Gliozzo et al. 2016b.

<sup>28</sup> Piazza Bovio: De Francesco et al. 2014. Na tem najdišču je bila prepoznana še ena, za zdaj nedoločena steklena masa.

<sup>29</sup> Arletti et al. 2010b.

<sup>30</sup> Zucchiati et al. 2007.

<sup>31</sup> Maltoni et al. 2015.

<sup>32</sup> Foy et al. 2003; Foster, Jackson 2009, 192–193; Gallo et al. 2014, 15–17.

<sup>17</sup> Sternini 1995, 267–268; Silvestri, Molin, Salviulo 2005, 811.

<sup>18</sup> Sagadin 2000; 2004; cf. Lazar 2003, 78–79, 217–218.

<sup>19</sup> Sagadin 2000; 2004; cf. Lazar 2003, 78–79, 217–218.

<sup>20</sup> Šmit et al. 2013, 53–54.

Risba (T.)	Vzorec	Datacija (stoletje)	Stavba	Faza naselbine	Barva	Skupina
I: 4	ustje	?	1	-	zelenkasta	Lev I
I: 5	zataljeno ustje	5.-7.	1	mešano	zelenkasta	Lev I
I: 7	zataljeno ustje	5.-7.	1	PA 2	zelenkasta	Lev I
I: 8	zataljeno ustje	5.-7.	1	PA 2	zelena	Lev I
I: 9	zataljeno ustje	5.-7.	2	-	zelenkasta	Lev I
I: 10	zataljeno ustje	5.-7.	3	PA 2	zelenkasta	Lev I
I: 11	zataljeno ustje	5.-7.	3	mešano	rumenkasta	Lev I
I: 12	zataljeno ustje	5.-7.	osrednja cerkev	uničenje PA 2	rumena	Lev I
I: 13	zataljeno ustje	5.-7.	osrednja cerkev	uničenje PA 2	zelenkasta	Lev I
I: 15	dno kozarca	4.-5.	1	PA 1	zelena	Lev I
I: 17	dno kozarca	4.-5.	osrednja cerkev	PA 2	zelenkasta	Lev I
I: 18	dno kozarca	4.-5.	memorija	uničenje PA 2	svetlomodra	Lev I
I: 20	nizka noga kozarca	5.	1	PA 2	rumenozelena	Lev I
I: 22	noga kozarca	pozno 5.-7.	1	PA 2	zelena	Lev I
I: 24	noga kozarca	pozno 5.-7.	1	-	rumena	Lev I
2: 1	noga kozarca	pozno 5.-7.	2	PA 2	zelena	Lev I
2: 2	noga kozarca	pozno 5.-7.	3	PA 2	zelenkasta	Lev I
2: 3	noga kozarca	pozno 5.-7.	severna cerkev (pod narteksom)	PA 2	rumenkasta	Lev I
2: 4	noga kozarca	pozno 5.-7.	memorija	uničenje PA 2	zelenkasta	Lev I
2: 5	svetilka	5.-7.	osrednja cerkev	PA 2	zelenkasta	Lev I
2: 6	svetilka	5.-7.	osrednja cerkev	PA 2	zelena	Lev I
2: 7	svetilka	5.-7.	1	PA 2	rumenkasta	Lev I
2: 9	dno balzamarija	5.-7.?	1	PA 2	rumenozelena	Lev I
2: 10	ostenje posode	5.-6.?	1	mešano	zelenkasta	Lev I
2: 13	vrat steklenice	4.-7.?	1	mešano	zelena	Lev I
-	okensko steklo	5.-7.	1	PA 2	rjavkasta	Lev I
I: 1	ustje kozarca	1.	1	-	modra	ZR
-	ostenje posode	zg. rim. doba	1	PA 2	modra	ZR
I: 6	zataljeno ustje	5.-7.	1	PA 2	zelenkasta	RBG?
I: 16	dno kozarca	4.-zg. 5.	1	PA 1	zelena	RBG?
I: 19	nizka noga kozarca	5.	1	LA 2	zelenkasta	RBG?
I: 21	nizka noga kozarca	5.	prostor med cerkvami	uničenje PA 2?	brezbarvna	RBG?
I: 23	noga kozarca	pozno 5.-7.	1	PA 2	svetlomodra	RBG?
2: 8	ročaj	5.-7.?	1	-	zelena	RBG?
2: 11	štiridelna jagoda	?	prostor med cerkvami	uničenje PA 2?	modra, rdeča	RBG?
2: 12	ustje steklenice	4.-7.?	1	PA 2	zelena	RBG?
2: 16	ustje sklede Foy 21a	5.-6.	1	PA 2	brezbarvna	RBG?
I: 2	odrezano ustje	4.-zg. 5.	severna cerkev (pod narteksom)	PA 2	zelena	HIMT
I: 3	odrezano ustje	4.-zg. 5.	prostor med cerkvami	uničenje PA 2	zelenkasta	HIMT
I: 14	dno kozarca	4.-zg. 5.	1	-	olivnozeleno	HIMT
2: 14	cevasta jagoda	?	prostor med cerkvami	uničenje PA 2?	rdeča	Lev II?
2: 17	krožnik	5.-7.?	1	PA 2	zelena	Lev II?
2: 15	segmentirana jagoda	8.-9.	1	ZSV	modra	halofitsko

Sl. 2: Tonovcov grad, analizirani vzorci stekla. Določitev skupin: Ž. Šmit in Th. Rehren.

PA 1 = poznoantična faza 1; PA 2 = poznoantična faza 2; Lev I = Levantine I; Lev II = Levantine II; ZR – zgodnjersko; RBG = rimsko modro-zeleno; HIMT = visoka vsebnost železa, mangana in titana

značilno za prostor okrog Jadranskega morja med 4. in 7. st.<sup>33</sup>

Skupina 10 posod je iz rimskega modro-zelenega (RBG) stekla (*t. 1*: 6,16,19,21,23; 2: 8,11,12,16; ena ni risana). Dve od teh sta tudi tipološko zgodnji posodi (*t. 1*: 1; modro ostenje ni risano), njuna sestava je izrazito različna od ostalih devetih, tipološko kasnejših primerkov. Štirje odlomki (*t. 1*: 16; 2: 8,11,12) so pokazali povišanje vrednosti titana, kar bi lahko razložili kot sledove recikliranja z maso HIMT med sekundarno proizvodnjo, lahko pa pomeni le, da je bilo steklo izdelano iz malo drugačnega peska.

Steklo HIMT je bilo očitno lažje za obdelavo kot Levantine I zaradi višje vsebnosti sode, ki je omogočala uporabo nižjih temperatur za taljenje, vendar je bilo obenem narejeno iz peska nižje kvalitete. Zato je bilo cenejše od kvalitetnejšega stekla Levantine I in verjetno tako široko priljubljeno v 4. in 5. st.<sup>34</sup> V 7. in 8. st., ko so zaloge natrona očitno postale omejene in dražje zunaj Egipta, je prav nasprotno, postalo dražje.<sup>35</sup>

Barva stekla je lahko včasih neposredno povezana s sestavo steklene mase,<sup>36</sup> ne pa vedno.<sup>37</sup> Med analiziranimi vzorci s Tonovcovega gradu so le zgodnjerska posoda in steklene jagode obarvane namenoma. Skupina RBG vsebuje dva brezbarvna odlomka in enega svetlomodrega, ostali so zeleni. Vsi odlomki HIMT in skoraj vsi Levantine I so v odtenkih med rumeno in zeleno, včasih rjavkasto. En kos Levantine I je svetlomodrer.

### Odnos med tipologijo posod in sestavo stekla

Poskusi povezati tipe posod in sestavo steklene mase med seboj, da bi videli, ali tip mase vpliva na tip iz izdelane posode, za zdaj niso številni.<sup>38</sup> Tisti, ki so poskusili, še ne poročajo o zelo obetavnih rezultatih, vendar so raziskave še v teku. V Akvileji in *Classe* v Raveni niso opazili korelacij med sestavo in obliko posod, le morebitno povezavo med enim od tipov steklenic in

steklom HIMT na najdišču *Casa dele bestie ferite* v Akvileji.<sup>39</sup> V Herdoniji so lahko povezali nekaj tipov posod s steklom HIMT.<sup>40</sup>

S Tonovcovega gradu so bile analizirane naslednje skupine steklenih posod: odrezana ustja, zataljena ustja, dna kozarcev, noge kozarcev, ustje in vrat steklenic, dno balzamarija, noga krožnika, svetilke z ročajčki, ostenje posode, jagode in okensko steklo (*t. 1*; 2). Dva odlomka pripadata zgodnjerskim posodam, čaša Isings 12 in ostenje tipološko nedoločene posode (*t. 1*: 1; ostenje ni risano). Kot pričakovano, se njuna sestava znatno loči od kasnejših in je značilna za obdobje 1.–3. st.

Odrezana ustja in dna kozarcev pripadajo kozarcem tipov Isings 106 in 109 (*t. 1*: 2,3,14–18), ki so večinoma datirani v 4.–5. st., vendar se pojavljajo tudi kasneje, posebno oblika Is 106.<sup>41</sup> Obe analizirani odrezani ustji sta izdelani iz stekla HIMT, prav tako eno dno. Tri dna imajo Levantine I in eno RBG sestavo mase.

Kozarci na nizki nogi (*t. 1*: 19–21) so datirani najpogosteje v 5. st. in so bolj značilni za pozno-rimske kot poznoantične zbirne najdb.<sup>42</sup> Na Tonovcovem gradu sta bila dva izdelana iz stekla RBG in eden iz Levantine I.

Kozarci na nogi (*t. 1*: 22–24; 2: 1–4) so najpogostejši tip steklenih posod v poznoantičnem Sredozemlju od poznega 5. st.<sup>43</sup> Razen enega so bili vsi izdelani iz stekla Levantine I. Svetlomodrer, nekoliko večji kos (*t. 1*: 23) je bil narejen iz stekla RBG. Za Tonovcov grad je vredno omeniti, da v plasteh faze PA 1 ni bil najden noben kozarec na nogi, našli so le en odlomek (dno kozarca, *t. 1*: 15), izdelan iz stekla Levantine I. To ne nasprotuje opredelitvi faz na najdišču, saj so maso Levantine I uporabljali od poznega 4. st., čeprav je največjo priljubljenost dosegla kasneje.<sup>44</sup>

Vse tri analizirane svetilke z ročajčki (*t. 2*: 5–7) so bile narejene iz mase Levantine I, nečistoče v steklu celo nakazujejo, da so bile lahko izdelane iz iste pošiljke surovega stekla.<sup>45</sup> Tudi okensko steklo (ni risano) in dno balzamarija (*t. 2*: 9), najdeno v plasti faze PA 2, sta bili narejeni iz stekla Levantine I. Ustje in vrat steklenic (*t. 2*: 12,13) sta bila izdelana: prvo iz RBG in drugi iz mase Levantine I.

<sup>33</sup> Gliozzo et al. 2016a, 98–105.

<sup>34</sup> Foster, Jackson 2009; Gallo et al. 2014, 17; Nenna 2014, 186.

<sup>35</sup> Freestone et al. 2015.

<sup>36</sup> V Akvileji in Kartagini je steklo Levantine I v odtenku *aqua*, HIMT pa je rumeno-zeleno: Gallo et al. 2014, 15; Siu, Henderson, Faber 2017, 269. Tudi Phelps et al. 2016, 66.

<sup>37</sup> Nenna 2014, 186.

<sup>38</sup> Za zgodnjersko smaragdnozeleno steklo glej Jackson, Cottam, Lazar 2015.

<sup>39</sup> Gallo et al. 2014, 16, sl. 9; Maltoni et al. 2015, 15.

<sup>40</sup> Gliozzo et al. 2016a, 106.

<sup>41</sup> Milavec 2011a, 86; Gallo et al. 2014, tab. 2.

<sup>42</sup> Milavec 2011a, 85.

<sup>43</sup> Milavec 2011a, 84–85.

<sup>44</sup> Freestone, Wolf, Thirlwall 2005.

<sup>45</sup> Šmit et al. 2013, 58.

Noga krožnika (*t. 2: 17*) je zelo zanimiva, saj je sestava stekla podobna masi Levantine II, ki so jo izdelovali med 7. in 8. st. v Beit Eli'ezerju v Izraelu.<sup>46</sup> Prav tako odprte oblike posod v pozni antiki niso pogoste zunaj vzhodnega Sredozemlja, posebno ne v zaledju. Glede na to, da je bil najden en sam odlomek, so lahko prinesli na najdišče posodo, ne pa surovega stekla. Majhna rdeča cevasta jagoda (*t. 2: 14*) kaže zelo podobno sestavo, vendar ne njena oblika ne kontekst najdbe (glej v nadaljevanju) ne pripomoreta k dataciji. Štiridelna temnomodra jagoda (*t. 2: 11*) je bila najdena skupaj z majhno rdečo jagodo v plasteh grušč, s katerim so polnili prostor med cerkvami, in je bila izdelana iz stekla RBG. Jagod nismo mogli pripisati nobeni fazi naselbine. Njuna sestava kaže, da sta bili narejeni iz natronskega stekla podobne sestave kot nekatere posode na najdišču, torej ju verjetno lahko datiramo v poznoantično fazo, ne moremo pa izključiti, da so ju izdelali kasneje iz pretaljenih kosov.<sup>47</sup> Segmentirana modra jagoda (*t. 2: 15*), ki je ležala v zgodnjerednjeveški plasti, pripada priljubljeni skupini jagod iz časa okrog leta 800, ki so jih uvažali v Evropo iz vzhodnega Sredozemlja.<sup>48</sup> Analiza je potrdila, da je bila izdelana iz halofitskega stekla.

## ZAKLJUČKI

Najprej je treba poudariti, da, dokler ne bo narejenih več analiz poznoantičnega stekla v regiji, morajo ostati vsi zaključki hipotetični. Vzorci, o katerih je bil govor v članku, so za večino skupin surovega stekla relativno majhni, sicer razburljive rezultate pa je treba obravnavati previdno.

Poznorimske (PA 1) plasti na Tonovcovem gradu se zaradi kasnejših dogajanj na najdišču niso dobro ohranile in drobnih najdb iz teh plasti je malo. Razmeroma veliko število značilnih poznorimskih najdb je bilo po drugi strani odkritih v kasnejših, poznoantičnih (PA 2) premešanih plasteh in ruševinah, vendar je bilo malo steklenih posod. Kljub predvidenemu vojaškemu pomenu Tonovcovega gradu v poznorimskem obdobju je bil odkrit en sam odlomek kozarca z modrimi nataljenimi

steklenimi kapljami,<sup>49</sup> kakršne sicer na tovrstnih najdiščih najdejo precej. Razlog morda leži v tem, da v času razcveta vojaške vloge najdišča državna oskrba ni bila več redna ali pa je bila omejena na druge produkte.<sup>50</sup> Samo dva od analiziranih odlomkov izvirata iz nepremešanih plasti faze PA 1 (*t. 1: 15,16*). Gre za dve dni kozarcev sestave Levantine I in stekla RBG (morda mešana s HIMT), zato se zdi, da sta bili takrat obe vrsti surovega stekla na voljo. To je razumljivo za RBG, pa tudi Levantine I je krožila že v 4. st., čeprav je največjo priljubljenost dosegla v naslednjih stoletjih. Dve stekleni posodi, odrezano ustje iz stekla HIMT (*t. 1: 2*) in noga kozarca iz mase Levantine I (*t. 2: 3*), prihajata iz plasti pod narteksom severne cerkve, kar ju postavlja v čas pred gradnjo nartekusa, če ne celo cerkva.

Če pogledamo najdbe iz tipološke perspektive: dve poznorimski odrezani ustji in dno kozarca so bili izdelani iz stekla HIMT (*t. 1: 2,3,14*). Eno od ustij je bilo najdeno v plasti pod narteksom severne cerkve, kot smo že omenili, drugo v ruševini (*t. 1: 3*), za dno ni podatka (*t. 1: 14*). Zelo majhno število odrezanih ustij je bilo najdenih na najdišču, najverjetneje jih niso uporabljali v fazi PA 2, iz katere izvirajo številna zataljena ustja. Za dna ne moremo predvidevati enako, saj so take kozarce očitno izdelovali tudi po prvi polovici 5. stoletja, vendar z drugačnimi ustji.

Iz plasti faze PA 2 izvirajo večinoma posode iz stekla Levantine I. Odlomek ostenja zgodnjerske posode je očitno rezidualen, krožnik iz mase Levantine II (*t. 2: 17*) pa je zanimiv kos, ki bi (če je prepoznana prava masa) pomenil razmeroma pozno oskrbo naselbine s surovim steklom ali posodjem. Rdeča jagoda s podobno sestavo (*t. 2: 14*) je bila najdena v ruševini, odlomki posod iz RBG iz plasti faze PA 2 so mešan zbir tipov posod, ki se ne pojavljajo v velikem številu na najdišču in bi večino od njih lažje opredelili v 5. kot v 6. st. Za zdaj ne moremo določiti, ali so rezidualni ali sočasni v plasteh večinoma 6. st.

Kozarci na nogi, svetilke in okensko steklo pomenijo značilen poznoantični zbir steklenega posodja. Z izjemo noge, ki je ležala pod narteksom (glej zgoraj), so bili skoraj vsi kosi najdeni v plasteh faze PA 2 ali kasnejših ruševinah in skoraj vsi so bili izdelani iz mase Levantine I (vse noge kozarcev razen ene, vse svetilke, okensko steklo in vsa zataljena ustja razen enega).

<sup>46</sup> Freestone, Wolf, Thirlwall; Freestone et al. 2015.

<sup>47</sup> Zgodnjerednjeveško predelovanje rimskega stekla je dokumentirano na Gradišču nad Bašljem: Šmit et al. 2009; Knific, Šmit 2018.

<sup>48</sup> Greiff, Nallbani 2008, 367.

<sup>49</sup> Milavec 2011a, t. 54: 5.

<sup>50</sup> Ciglencečki, Milavec 2009.

Skupina 10 posod kaže sestavo, podobno rimskemu modro-zelenemu steklu (RBG), ki ga do sedaj niso zasledili na analiziranih najdiščih v soseščini. Posode v tej skupini tipološko niso tako pozne kot tiste iz stekla Levantine I in so v največji meri značilne za 5. st., npr. kozarci na nizki nogi, steklenica in skleda. Od kasnejših oblik je najdena ena noga kozarca, ki se od ostalih nog razlikuje po barvi in velikosti (*t. 1: 23*). Lahko je to starejša skupina v primerjavi z Levantine I, ni pa nujno. Če je pravilna domneva, da je bil del teh posod recikliran s steklom HIMT, bi to pomenilo, da sta bili obe masi dosegljivi sočasno.

Z mero previdnosti bi lahko videli nekaj povezav med tipologijo in sestavo steklene mase posod. Tipološko zgodnejši kosi so pogosto narejeni iz načeloma zgodnejših mas in so najdene v zgodnejših plasteh, so pa prisotne tudi v kasnejših. Ker se za najdišče predvideva prekinitvev poselitve v sredini in drugi polovici 5. st., bi to pomenilo sekundarno lokacijo najdb in ne daljše uporabe posod samih.

Segmentirana modra jagoda (*t. 2: 15*), ki je bila najdena v zgodnj srednjeveški plasti in je tipološko datirana med drugo polovico 8. in zgodnje 9. st., je bila narejena iz halofitskega stekla in je ostanek drugega obdobja trgovine z vzhodom, ki je redko zastopana na slovenskih zgodnj srednjeveških najdiščih. V tem primeru je zastopana trgovina z jagodami, ne surovim steklom. Novi podatki o steklenih predmetih na zgodnj srednjeveškem Moravskem<sup>51</sup> in rezultati analiz stekla na drugih slovenskih zgodnj srednjeveških najdiščih<sup>52</sup> bodo morda začeli razbijati mit o neobstoju izdelave in

uporabe stekla na zgodnj srednjeveških slovanskih območjih. Na Tonovcovem gradu zgodnj srednjeveških steklenih posod še niso našli.

Presenetljivo malo je bilo pri analizah odkritih sledi recikliranja. Pogosto poudarjamo avtarkični značaj poznoantičnih naselbin v jugovzhodnih Alpah in trgovanje na dolge razdalje zaznavamo le po prisotnosti oziroma odsotnosti keramične embalaže. Analize so pokazale, da je vsaj delno Tonovcov grad bil vključen v široke in barvite sredozemske mreže trgovine s surovim steklom. Delavnica ali delavnice, ki so ga oskrbovale, so lahko dobile surovce različnih mas iz Egipta ter Sirije in Palestine, morda še celo v zgodnjem 7. st. Količina najdb iz poznorimskih plasti na najdišču in cel analizirani vzorec še nista dovolj velika, da bi nam dovolila razumeti, koliko mas je bilo uporabljenih sočasno. Kot smo poudarili, naselbine v poznem 4. in zgodnjem 5. st. niso obilno oskrbovali s steklom.

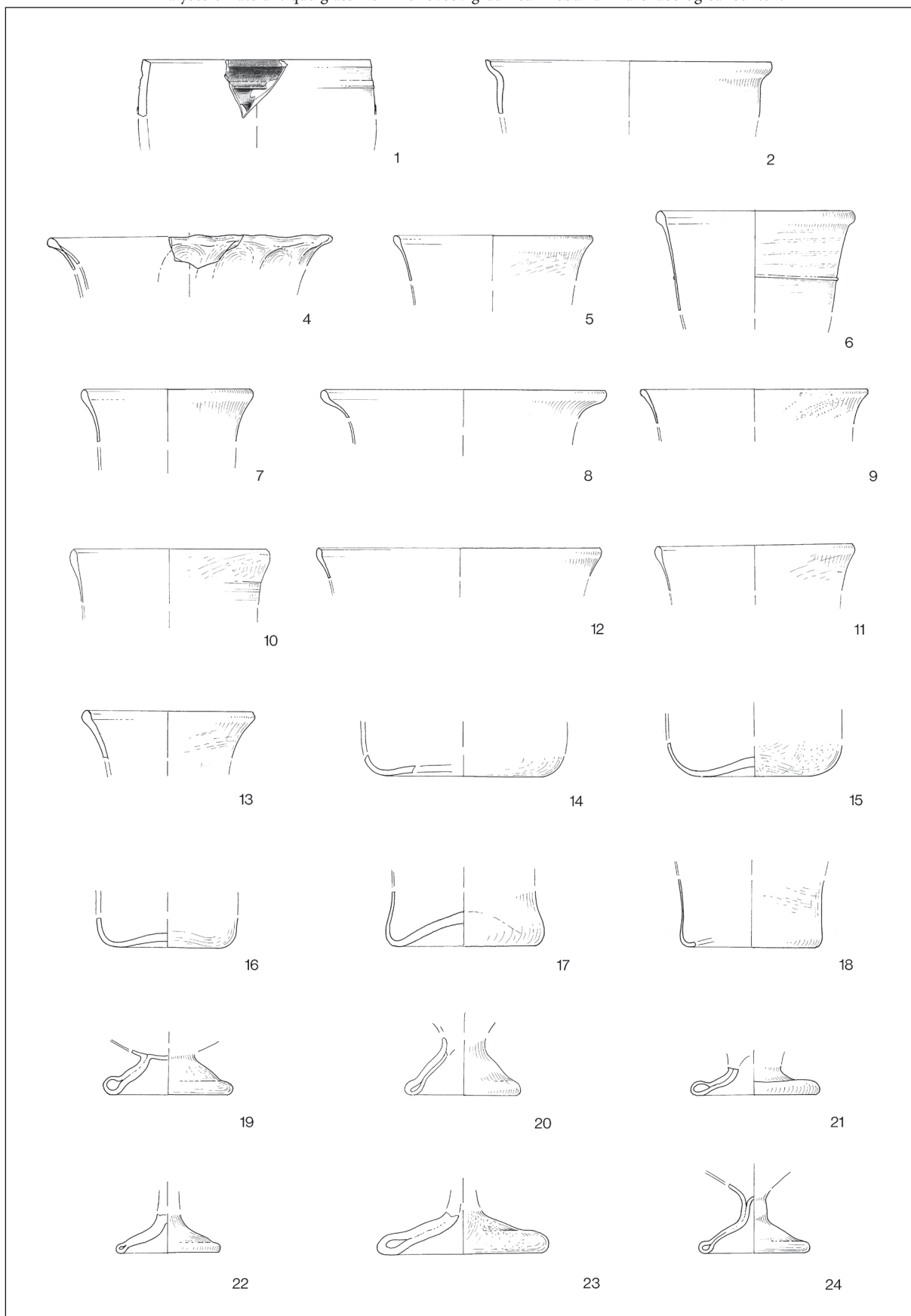
Tina Milavec  
 Oddelek za arheologijo  
 Filozofska fakulteta, Univerza v Ljubljani,  
 Aškerčeva 2  
 1000 Ljubljana  
 tina.milavec@ff.uni-lj.si

Žiga Šmit  
 Fakulteta za matematiko in fiziko  
 Univerza v Ljubljani  
 Jadranska 19  
 SI-1000 Ljubljana  
 Institut Jožef Stefan  
 Jamova 39  
 SI-1001 Ljubljana  
 ziga.smit@fmf.uni-lj.si

<sup>51</sup> Sedlačková 2006; Galuška et al. 2012.

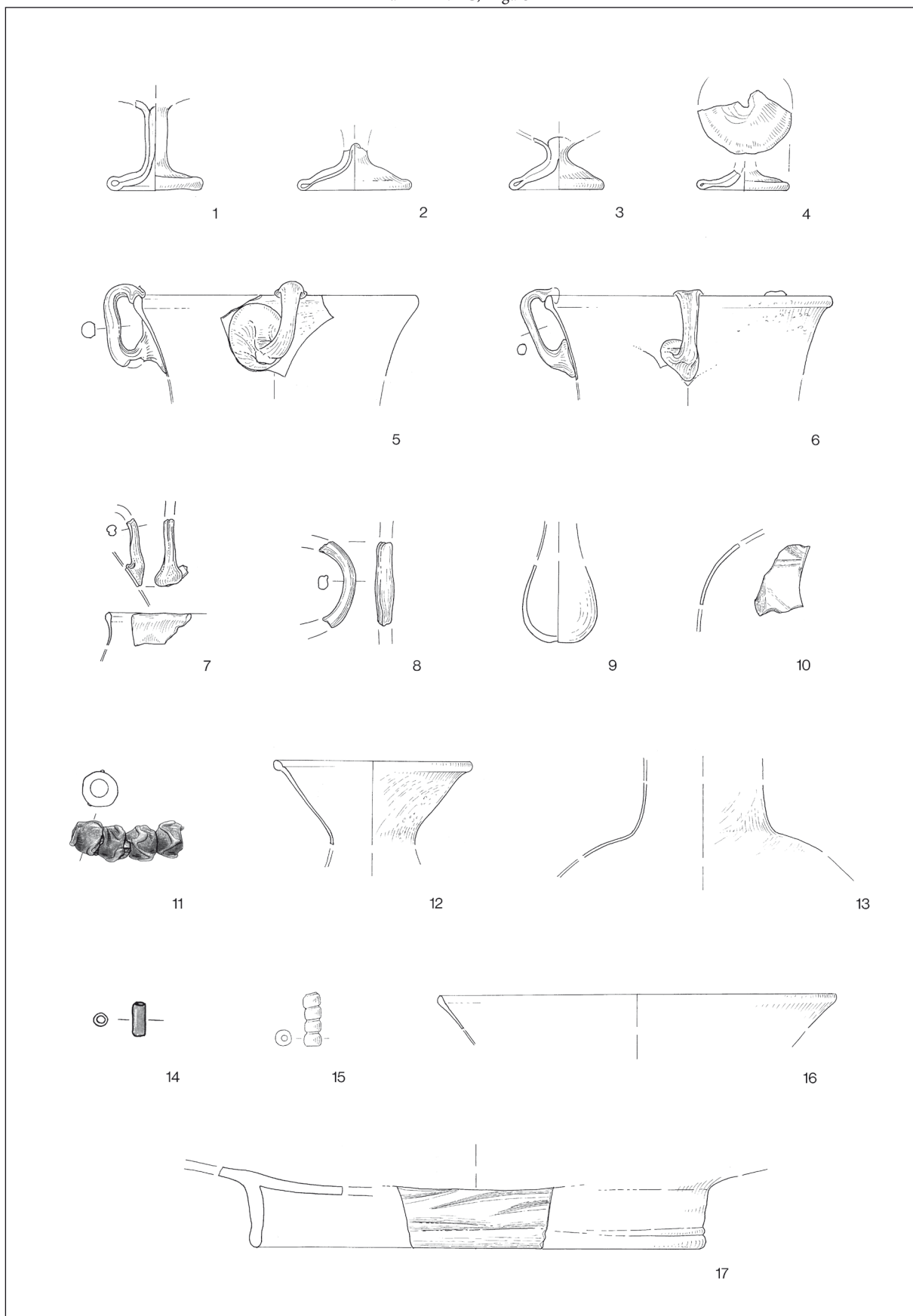
<sup>52</sup> Šmit et al. 2009; Knific, Šmit 2018.





Pl. 1: Tonovcov grad, all glass. Scale = 1:2.

T. 1: Tonovcov grad, vse steklo. M. = 1:2.



Pl. 2: Tonovcov grad, all glass. Scale 1–13,15–17 = 1:2; 14 = 1:1.

T. 2: Tonovcov grad, vse steklo. M. 1–13,15–17 = 1:2; 14 = 1:1.