ARRC – Acculturation, Romanisation, Roman Culture: Processes of Integration Across the Roman Empire

Edited by László Borhy, Kata Dévai, Linda Dobosi, and Csilla Sáró

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Edited by
László Borhy – Kata Dévai – Linda Dobosi – Csilla Sáró

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Contents

László Borhy 9

Foreword

László Borhy 13

Aspects of romanisation in Pannonia: Introduction and remarks

József Beszédes 21

Integration? Romanisation? Tomb of an auxiliary soldier of Celtic origin

Sorin Ilie Cociș – Vlad-Andrei Lăzărescu 39

Fashion in Roman Dacia: Local production of anchor brooches – the hinged fastening variant

Illés János Darvas-Tanács 51

Coins of a 2019 field survey from the legionary camp of Brigetio (Komárom/Szőny, Hungary)

Charlotte Defer 69

Prestigious Roman homes built in Aeduan territory: The example of the peristyle houses at Bibracte (Mont-Beuvray, France)

Kata Dévai 79

Trends in the use of glass vessels and its ritual connotations at the Iseum Savariense

Linda Dobosi – Tamás Szabadváry 93

Three Roman game boards from Pannonia in the collection of the Hungarian National Museum

Damjan Donev 109

Transformations along the western part of the Via Egnatia in Roman Antiquity

Rachele Dubbini – Barbara Bramanti – Jessica Mongillo – Giulia De Palma 143

Hybrid population in the city of Rome: Funerary customs and practices from the Via Appia Antica 39 burial complex

Evgeniy Gorokhovskiy – Oksana Gopkalo 165

Once again about 'Sarmatian'-type *fibulae* (Almgren Group VII, Form 210 and similar) in the Chernyakhiv culture

Lavinia Grumeza 237

Roman bead workshops at Tibiscum: Twenty years after

Irena Lazar 251

Development and changes in Roman glassmaking during the 1st century AD as reflected in the Roman road station Romula (Ribnica near Brežice, Slovenia)

Mia Leljak – Tino Leleković 289

Roman glass from Ban Josip Jelačić Square in Osijek

Francisco Marco Simón 305

Archaeology and the *interpretatio* of an ancient Iberian sanctuary: From El Cerro de los Santos to Ad Palem

Pierre Mazille – Camille Bossavit 317

Copper alloys in Gaul under the Roman conquest: The *Celtic Brass Coins* project

Dorothea Mildová 327

Sacrificial places in funerary contexts of Roman Thrace: Character and meaning of ritual places in grave contexts of Roman Thrace—evidence from the Yambol region

Zsolt Mráv – Réka Neményi 359

Archaeological excavation of a new Roman-period wagon grave and its adjacent horse burial at Belvárdgyula (Baranya County, Hungary) in 2021: Interim research report

Dimitar Nikolovski 385

ANNI BONI in Stobi: Gold glass in funerary context

Rita Helga Olasz 397

Was there a doctor in Brigetio?

Coriolan Horațiu Opreanu – Vlad-Andrei Lăzărescu 423

Getting to know each other: Examining trade across the Roman *limes* at Porolissum (Moigrad, Romania)

Simone Pastor 441

Romanisation: An evolving historical concept

Laurențiu Radu 453

Callatis: A Greek city in the Roman Empire

Csilla Sáró 465

For old times' sake…: Dress accessories from a north-east Pannonian grave

Hedvika Sedláčková – Dana Rohanová – Pavel Fojtík – Miroslav Popelka – Jaroslav Peška 483

Bohemia and Moravia in the Migration Period — Contacts reflected through glass vessels: A preliminary report on form groups

Katarina Šmid 525

The iconography of the Seasons in Poetovio stone reliefs and its connections to other artistic centres

Eszter Soós – Jan Jílek – Klara De Decker – Viktória Mozgai – Bernadett Bajnóczi 537

Selected Roman bronze vessels from the early Roman period cemetery in Vinár-Cseralja, northern Pannonia

F. Zsófia Sörös 559

New results from the Tihany-Óvár *oppidum*, Hungary: Finds from the so-called 'cellar'

Ádám Szabó 597

The phenomenon of altars named in their inscriptions and an altar with an additional function

Csaba Szabó – Ernő Szabó – Radu Ota 611

The cult of Roman Mithras in Apulum: Glocality of Roman religion in an urban context

Dániel Szabó 657

Becoming Roman? Tracing Mediterranean influences in the archaeological finds of the Hungarian excavations from the monumental complex of the "Grandes Forges" *insula* at Bibracte

Lőrinc Timár 669

The '*basilica*' of Bibracte: A derivative or prototype of Vitruvius' *basilica*?

Pedro Trapero Fernández – André Carneiro 687

Wine and power in Roman Lusitania: Production, epigraphy and the inland economy of the Alentejo

Kristina Turkalj – Elena Perković Gjurašin – Andrej Janeš 705

Painted glass from Osor

Tatiana Votroubeková 713

Continuity and change: The romanisation of Southern Etruria

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Bohemia and Moravia in the Migration Period — Contacts reflected through glass vessels

A preliminary report on form groups

In honour of Jaroslav Tejral (1933–2024)

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Abstract: This contribution presents a comprehensive overview of glass vessels—most of them from graves dating to the 5th and 6th centuries AD—found at 29 sites in what is now Bohemia and Moravia. Some were recovered between the 1870s and 1945, while others come from post-war excavations, especially those conducted after 2000. Some of the material is already published ('old finds', Slatiňany, Vlíněves, and Praha-Zličín), but there are also unpublished vessels (Držovice, Vrchoslavice, and Všetuly). The finds are discussed in groups of rounded forms and cone beakers, each represented by several variants and evaluated in the context of other sites. An integral part of the study is the analysis of the composition of 26 natron-glass vessels, in some cases with the deliberate addition of raw materials containing Fe and Mn to obtain a desired yellow-green or green hue. By comparing the results with published data, it is possible to estimate their areas of origin. It is also noteworthy that their chemical compositions consistently show slight differences, indicating production at various locations in the Middle East. This study provides evidence for incorporating this lesser-known component of material culture into the broader picture of the Migration Period.

Keywords: Migration Period, glass vessels, forms, Bohemia, Moravia, chemical analyses

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Introduction

The first two authors of this article have been systematically engaged for many years in the study and evaluation of archaeological glass finds from the Middle Ages and the Renaissance, Baroque and later periods, particularly from Moravia, Bohemia, Poland,[1] Austria and Slovakia.[2] They have also studied glass from the earlier Great Moravian Period.[3] Owing to their long-standing friendship with Jaroslav Tejral, they have also studied glass from princely tombs in Blučina and Žuráň,[4] and more recently from Roman urn graves in Třebusice in Bohemia.[5] Their recently published monograph is devoted to the collection of ancient glass in the Museum of Decorative Arts in Prague.[6] The other three authors are researchers specialising in prehistoric cultures and have provided unpublished finds and related information.

The authors returned to the vessels from the Migration Period at the request of Jan Jílek in connection with his preparation of a comprehensive study assessing the finds from two skeletal graves uncovered near Slatiňany, Chrudim District in central Bohemia.[7]

Current state of research into glass vessels in Bohemia and Moravia

Bohemia

When preparing an article on the vessels from Slatiňany, we familiarised ourselves with other vessel finds from Bohemia (Fig. 1.1–17). It was surprising to discover that the last overview and evaluation of this part of the Migration Period material culture was published in Bedřich Svoboda's monograph.[8] It lists finds from approximately 1870 to 1945; Svoboda divided them into two time periods, the earlier ('Vinařice') phase and the later ('Merovingian' culture). At that time, he included 62 sites in the Vinařice phase[9] and as many as 86 sites, mostly with graves and fewer with settlements, in the 'Merovingian' culture.[10] According to this list, glass vessels were found in graves at twelve sites of the Vinařice culture and at only three sites of the 'Merovingian' culture.

Finds of glass vessels were known in 1965 (in alphabetical order) from

- Čertova ruka, a hillfort near Mašov in Semily District: a rare find, fragments of two vessels, Vinařice phase (Fig. 1.1, Fig. 2, Fig. 4.1/1, Fig. 7.1/2a–c);[11]
- Kolín-Gasworks, Grave 4/1942, an inhumation burial: cone beaker/lamp found beside the head, Vinařice phase (Fig. 1.2, Fig. 3.2/3);[12]
- Měcholupy near Žatec, Louny District, inhumation grave of a woman, discovered around 1930: a semi-ovoid beaker and a golden *solidus* of Emperor Constantin III (407–411), minted in Trier, Vinařice phase (Fig. 1.4, Fig. 2.4/11);[13]

1 E.g., Sedláčková 2006; Sedláčková *et al.* 2016; Sedláčková 2018; Sedláčková 2019; Rohanová *et al.* 2024 and numerous articles in professional journals.

2 E.g., Sedláčková *et al.* 2014; Sedláčková *et al.* 2016.

3 Galuška *et al.* 2012; Sedláčková – Rohanová 2020.

4 Sedláčková 2016.

5 Sedláčková – Rohanová 2024.

6 Sedláčková 2024.

7 Jílek *et al.* 2025, 287–352.

8 Svoboda 1965, 109–112.

9 Svoboda 1965, 298–299, Fig. 78.

10 Svoboda 1965, 300–301, Fig. 79.

11 Filip 1947, 227, Tab. 46.1–13; Svoboda 1965, 299, no. 25 (Mašov); Turnov Museum, Inv. nos A 2294–A 2299.

12 Svoboda 1965, 248, 249, 299, no. 19, Tab. 38.1; Kolín Museum, Inv. no. A 14 543.

13 Svoboda 1965, 299, no. 26, Tab. 28.6; Droberjar 2008, 188, Fig. 109.1; Žatec Museum, Inv. no. 2270.

- Praha-Bubny: a bowl with white arcs, now missing; 'Merovingian' culture (Fig. 1.5);[14]
- Praha-Kobylisy (Fig. 1.6): inhumation Grave III/1932: a semi-ovoid beaker (Fig. 2.6/13),[15] inhumation Grave IV/1932: a complete Kempston-type beaker, and Grave I: a Kempston-type beaker fragment, Vinařice phase (Fig. 4.6/14–15);[16]
- Praha-Podbaba, saved from disturbed graves at the end of the 19th century: a cone beaker and a ribbed bottle attributed to the Vinařice phase (Fig. 1.7, Fig. 3.7/16, Fig. 8.7/17);[17]
- Praha-Veleslavín, brickyard at the Bank of Vienna, inhumation grave found in 1915: Kempston-type beaker; only a photo has survived (Fig. 1.8, Fig. 4.8/18);[18]

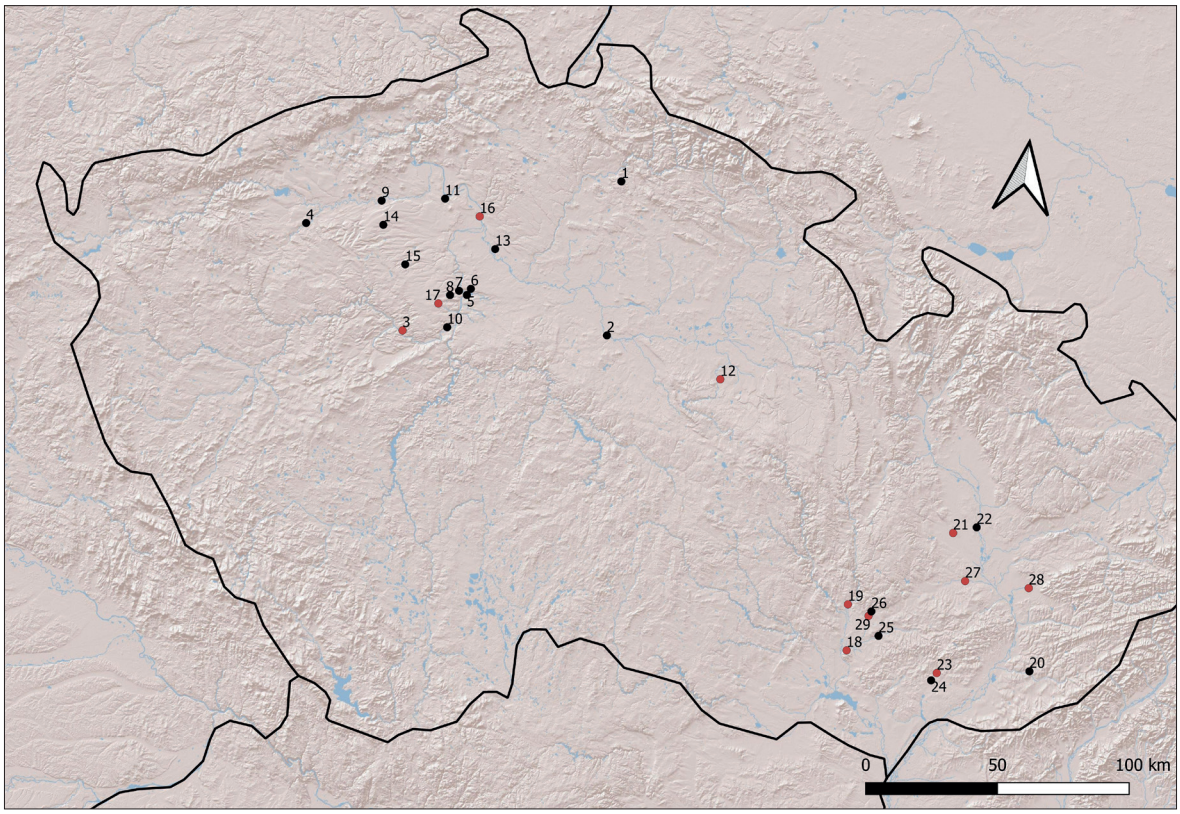


Fig. 1. Map showing the locations of sites yielding glass vessels from the Migration Period in Bohemia and Moravia (prepared by Jan Musil). Black dots represent finds dated to before 1945, red dots represent finds up to 2024. 1 – Čertova ruka hillfort near Mašov, k. ú. Karlovice, Semily District, 2 – Kolín-Gasworks, 3 – Kozel hillfort near Hostim, Beroun District, 4 – Měcholupy near Žatec, Louny District, 5 – Praha-Holešovice, Bubny, 6 – Praha-Kobylisy, 7 – Praha-Podbaba, 8 – Praha–Veleslavín, 9 – Radonice n. Ohří, Louny District, 10 – Radotín, Praha-západ, 11 – Roudnice n. L. – Hracholusky, Litoměřice District, 12 – Slatiňany Chrudim District, 13 – Tišice, Mělník District, 14 – Úherce, Louny District, 15 – Vinařice, Kladno District, 16 – Vlíněves, Mělník District, 17 – Praha-Zličín, 18 – Blučina, Cézavy near Blučina, Brno-venkov District, 19 – Brno-Černá Pole, 20 – Drslavice, Uherské Hradiště District, 21 – Držovice, Prostějov District, 22 – Charváty, Olomouc District, 23 – Kyjov, Hodonín District, 24 – Mistřín, Svatobořice-Mistřín, Hodonín District, 25 – Šaratice, Vyškov District, 26 – Velatice, Brno-venkov District, 27 – Vrchoslavice, Prostějov District, 28 – Všetuly, Holešov-Všetuly, Kroměříž District, 29 – Žuráň, near Podolí, Brno-venkov District.

14 Svoboda 1965, 259, 300, 301, no. 51.

15 Svoboda 1965, 299, no. 39, Tab. 27.7. National Museum Praha, Inv. no. 43 936.

16 Grave IV/1932: Svoboda 1965, 299, no. 39, Tab. 27.6; Droberjar 2008, 188, Fig. 109.7; Jiřík *et al.* 2015, 187 above; National Museum Praha, Inv. no. 43 935; Grave I: Svoboda 1965, Tab. 28.3, missing.

17 Svoboda 1965, 299, no. 42, Tab. 28.5, 10; Droberjar 2008, 188, Fig. 109.10; Jiřík *et al.* 2015, 187, below rights; National Museum Praha, Inv. no. H1-508 320 and missing.

18 Svoboda 1965, 299, no. 43, Tab. 28.11; destroyed.

- Radonice nad Ohří, Louny District, inhumation graves: beakers or lamps (missing) (Fig. 1.9, Fig. 5.9/19);[19]
- Radotín, Praha-Západ (West) (today Praha), Grave 1/1924: beaker fragments (missing), an aureus of Emperor Arkadius (AD 395–408); Grave 3/1924: a complete semi-ovoid beaker, Vinařice phase (Fig. 1.10, Fig. 2.10/20);[20]
- Roudnice nad Labem – Hracholusky, Litoměřice District, disturbed graves: vessel fragments (decayed), 'Merovingian' culture (Fig. 1.11);[21]
- Tišice, Mělník District, inhumation grave from 1912: a Snartemo beaker, Vinařice phase (Fig. 1.13, Fig. 4.13/25);[22]
- Úherce, Louny District, inhumation grave: an indented bowl, Vinařice phase (Fig. 1.14, Fig. 7.14/26);[23]
- Vinařice, Kladno District, inhumation graves discovered about 1870: a semi-ovoid beaker, a lamp, and a decorated bowl, Vinařice phase (Fig. 1.15, Fig. 2.15/28, Fig. 5.15/27, Fig. 7.15/29).[24]

The Migration Period in Bohemia began only at the start of the 5th century AD with the Vinařice phase, which ended sometime in the last decades of century and was followed by the 'Merovingian' culture that lasted until the mid-6th century AD.[25]

New finds appeared in Bohemia after 2000, i.e. many decades—almost half a century—later. The first published examples resulted from research conducted at an inhumation burial ground in Vlíněves near Mělník in central Bohemia. At the burial ground, uncovered in 2007 and dated to the earlier Vinařice phase, 21 inhumation graves containing 22 individuals were unearthed, of which three contained glass vessels (Fig. 1.16). One vessel, interpreted as a lamp, was found above the head in Grave 188 (Fig. 5.16/30 – A4[26]);[27] the second, a beaker, was placed in a niche above the head in Grave 195 (Fig. 3.16/31 – A3);[28] the last one, likewise a beaker, has not yet been published (Fig. 3.16/32).

An extensive burial ground with 197 graves from the 5th and 6th centuries AD was excavated in 2005–2006 in Zličín in the western part of present-day Praha; 18 glass vessels were recovered from the graves (Fig. 1.17).

A comprehensive publication, with contributions from several authors, presented the research results and their significance for the study of this period in the Barbarian era to the general public. The groups of finds assessed also included glass vessels.[29] In the monograph, which comprehensively covers all aspects of the Praha-Zličín burial ground, Jaroslav Jiřík also included a chapter on glass vessels, assessing

19 Svoboda 1965, 299, no. 47, Tab. 28.7; Maul 2002, Vol. II, Taf. 72.4.

20 Svoboda 1965, 299, no. 48, Tab. 32.14.

21 Svoboda 1965, 301, no. 65.

22 Svoboda 1965, 299, no. 55, Tab. 28.9, Jiřík *et al.* 2015, 188; Tejral 2016, 105 and 107, Fig. 1. National Museum Praha, Inv. no. H1-524700.

23 Svoboda 1965, 299, no. 57, Tab. 31.17; Droberjar 2008, 188, Fig. 109.2. National Museum Praha, Inv. no. 50 796.

24 Svoboda 1965, 299, no. 59, Tab, 28.1,8; Droberjar 2008, 188, Fig. 109.4,6; Jiřík *et al.* 2015, 144; Tejral 2016, 105, 107, Fig. 1. National Museum Praha, Inv. nos H1-50 754, H1 50 755 and H1 50 756.

25 Svoboda 1965, 219–220.

26 The 'A+number' following each image reference is the test number of the sample taken from the object; detailed information on these samples is provided in Tab. 1.

27 Limbursky *et al.* 2010, 127, 144, Photo 14.4.

28 Limbursky *et al.* 2010, 134, 135, 144, Fig. 25.3, Foto 14.3.

29 Jiřík *et al.* 2015, 24–33.

vessels from individual graves in a broader chronological and cultural context.[30] He created his own categories, which are difficult to compare with the scheme presented below; we therefore do not use them.

After the aforementioned publications, beakers of several variants were identified in Graves 15, 31, 76, 89, and 91; in Graves 76 and 91, the vessel was placed in a niche above the head of the deceased[31] (Fig. 2.17/34, 35 – A5, 39, 42, and 44). Cone beakers, both plain ones and those with applied decoration, were found in niches above the head in Graves 37, 78, 94, 129, and 157 (Fig. 3.17/36, 40 – A6, 46 – A7, 47, 50).[32] Only one Snartemo beaker was discovered in a niche, namely in Grave 87 (Fig. 4.17/41).[33]

In Graves 10, 49, and 93, vessels found in the niches are presumed to have served as lamps (Fig. 5.17/33, 37, 45).[34] The spectrum of vessel forms from Zličín is completed by bottles from Graves 70, 90, 143, and 144, all of which were placed in niches (Fig. 8.17/38, 43 – A8, 48 – A9, 49).[35]

The latest discovery, in 2018, was that of the aforementioned graves near Slatiňany, dating to the late 5th century AD. An archaeology enthusiast accidentally unearthed an unexpected find at the hillfort of Kozel near Beroun in central Bohemia in 2022. The 'treasure' comprised seven vessels, two complete and five fragmentary, six of which had been inserted into the seventh. This unique find has so far only been presented on Czech Television;[36] for completeness, it was included in the list (Fig. 1.3).[37] The assemblage consists of two Snartemo-type conical beakers, lamp/beakers, and a small bottle (Fig. 4.3/4, 5, Fig. 5.3/6, Fig. 8.3/7) dated to the 5th century AD, most likely to its beginning. At this point, further vessels could not be identified.

Moravia

At the end of the Second World War, only a few inhumation graves with glass vessels were known in Moravia (Fig. 1.18–29). The first was discovered in 1926 near Charváty, Olomouc District, and contained a semi-ovoid beaker and a gold necklace (Fig. 1.22, Fig. 2.22/57).[38] A year later, another grave was found near Mistřín, Hodonín District; it contained unidentified glass fragments, which went missing since (Fig. 1.24).[39] Yet another burial, containing a beaker, was found at Drslavice near Uherské Hradiště in 1934 (Fig. 1.20, Fig. 2.20/55 – A24);[40] an Grave 10 in Velatice, an inhumation burial containing a cone beaker was uncovered in 1936, but also went missing (Fig. 1.26);[41] and a

30 Jiřík 2019, text, 3.11, *Skleněné nádoby*, 139–150.

31 Grave 15: Jiřík *et al.* 2015, 189; Jiřík 2019, Catalogue, Tab. 4.1. Grave 31: Jiřík 2019, Catalogue, Tab. 7.5. Grave 76: Jiřík *et al.* 2015, 190; Jiřík 2019, Catalogue, Tab. 15.6. Grave 89: Jiřík 2019, Catalogue, Tab. 17.14. Grave 91: Jiřík 2019, Catalogue, Tab. 17.13.

32 Grave 37: Jiřík *et al.* 2015, 201 above; Jiřík 2019, Catalogue, Tab. 8.2. Grave 78: Jiřík *et al.* 2015, 191, top middle; Jiřík 2019, Catalogue, Tab. 15.7. Grave 94: Jiřík *et al.* 2015, 144 centre; Jiřík 2019, Catalogue, Tab. 18.1. Grave 129: Jiřík *et al.* 2015, 191 top right; Jiřík 2019, Catalogue, Tab. 26.1. Grave 157: Jiřík *et al.* 2015, 86 top right; Jiřík 2019, Catalogue, Tab. 32.8.

33 Jiřík *et al.* 2015, 191 top left; Jiřík 2019, Catalogue, Tab. 17.3.

34 Grave 10: Jiřík 2019, Catalogue, Tab. 3.3. Grave 49: Jiřík *et al.* 2015, 191 below; Jiřík 2019, Catalogue, Tab. 11.5. Grave 93: Jiřík *et al.* 2015, 144 below; Jiřík 2019, Catalogue, Tab. 18.1.

35 Grave 70: Jiřík *et al.* 2015, 187 below left; Jiřík 2019, Catalogue, Tab. 14.18. Grave 90: Jiřík *et al.* 2015, 202 above; Jiřík 2019, Catalogue, Tab. 17.12. Grave 143: Jiřík *et al.* 2015, 202 below; Jiřík 2019, Catalogue, Tab. 28.30. Grave 144; Jiřík *et al.* 2015, 199; Jiřík 2019, Catalogue, Tab. 29.1.

36 https://ct24.ceskatelevize (last access: 15 September 2026).

37 We thank Jan Musil from the Pardubice Museum for editing the photos of the vessels.

38 Tejral 2011, 138, Abb. 95; Loskotová 2012; VMO, Inv. no. A 9110.

39 Inhumation grave from 1927: Adamíková 2020, Cat. 50, fragments not identified, missing.

40 Tejral 2011, 137, Fig. 94; Adamíková 2020, Cat. 44. MZM Brno, Inv. no. 68 417.

41 Tejral 1982, 220, Fig. 25.2; Adamíková 2020, Cat. 98; fragments of the cone beaker are known only from drawings.

glass goblet was found in a grave in Brno-Černá Pole in 1941 (Fig. 1.19, Fig. 6.19/54 – A23).[42] After the war, a find of bottle with a spherical body from Šaratice, Vyškov District, is mentioned in 1955; the vessel was dated to the first half of the 6th century AD (Fig. 1.25).[43]

Two 'royal' graves from the Migration Period to include glass vessels are also known from Moravia. The first was excavated at Žuráň Hill near Slavkov in 1949,[44] while the second in Cézavy near Blučina in 1953.[45] The burial of a man with a sword near Blučina, dated to the second half of the 5th century AD, contained three vessels, two of which have a highly unusual flute-like shape and are accompanied by a bottle with a spherical body (bulbous flask) (Fig. 1.18). An artistic reconstruction of the burial shows that the vessels were placed at the bottom of the grave near the right foot of the buried man.[46]

A woman's grave at Žuráň Hill was professionally excavated in 1949 but published only in 1995, with marking of the location of the finds, except for the fragments of four glass vessels. The fragments with repair holes include those of a yellowish glass goblet with facets; of a second vessel, also made of yellowish glass, of which only fragments with embossed blue Greek letters have been preserved; the fragment of a blue glass bowl with cut decoration with a circus scene; and a fragment of a blue cone beaker with a cut multi-storey build-up (Fig. 1.29). It was dated to the first half of the 6th century AD.[47]

New finds come from rescue excavations conducted after 2000 in central Moravia. During the construction of a motorway in 2004, the southern part of a burial ground with 12 skeleton graves—only three of which had not been plundered—was uncovered near the village of Vrchoslavice near Kojetín, Prostějov District (Fig. 1.27). Glass vessels were preserved in three disturbed graves: the lower part of a bicolour Snartemo-type beaker was found slightly to the right behind the head in Grave H6 (Fig. 4.27/63 – A13);[48] a complete monochrome beaker of the same type stood between the grave wall and the remains of the skeleton in Grave H9 (Fig. 4.27/64 – A14);[49] and three human skulls and a beaker/lamp were placed in the upper part of Grave H7 (Fig. 5.27/62 – A15), while beneath them, at the bottom of the grave pit, the skeletal remains of an individual without a skull were found in a non-anatomical position.[50] The burial ground dates to the mid-5th century AD.[51] Information about Moravian finds up to 2020 was included in Barbora Adamíková's[52] (later Vymazalová)[53] work on glass vessels in 5th-century AD graves in the Central Danube region.

During the expansion of the Nestlé car park near Holešov, Kroměříž District, in the administrative area of the village of Všetuly, a burial ground with 12 skeletal graves was discovered in 2024 (Fig. 1.28). In ten cases, the western part of the grave, from the head to the pelvis, was disturbed shortly after burial. One undisturbed grave contained a child, another, a woman with an artificially deformed skull.[54] In four disturbed graves, glass vessels were preserved thanks to their placement: in a niche above the head. Grave 500/800 contained a body fragment of a Snartemo-type beaker

42 Tejral 1982, 199; Adamíková 2020, Cat. 14; MZM Brno, Inv. no. 107 296.
43 Svoboda 1965, 224; Tejral 1982, 218; Adamíková 2020, Cat. 92.
44 Poulík 1995; Sedláčková 2016.
45 Tihelka 1963; Sedláčková 2016.
46 Jiřík *et al.* 2015, 91.
47 Sedláčková 2016.
48 Berkovec 2006, Fig. 57; Tejral 2016, 115, Abb. 4.b; Museum Prostějov, Find no. 19/2004-806-4.
49 Berkovec 2006, Fig. 60; Tejral 2013, 386, 391; Museum Prostějov, Find no. 19/2004-809-7.
50 Berkovec 2006, Fig. 62; Museum Prostějov, Find no. 19/2004-809-7.
51 Berkovec 2006, 5.
52 Adamíková 2020.
53 Vymazalová 2025.
54 Popelka 2024, 12–13.

(Fig. 4.28/65 – A16);[55] Grave 507/807, a complete Snartemo-type beaker (Fig. 4.28/66 – A17);[56] Grave 510/810, a purple glass goblet with blue parts (foot and rim, Fig. 6.28/68 – A18);[57] and Grave 508/808, a complete small bottle (Fig. 8.28/67 – A19).[58] The burial ground dates to the 5th century AD.[59]

Držovice, Prostějov District. The burial ground, excavated between 2020 and 2024, has so far yielded almost two dozen graves, most of which were reopened ('looted'). Grave 13/2024 contained the skeleton of an adult woman, lying, unusually, supine in an irregular oval grave pit. The conspicuously compact arrangement of the bones undoubtedly indicates that the body was tightly wrapped, or rather drawn, into a burial shroud or fabric. A small gilded silver pin inlaid with almandine and possibly ivory was discovered near the left shoulder. This is a very rare but highly reliable dating object, which places the grave in the first decades of the 6th century AD. Surprisingly, a secondarily modified glass vessel fragment, perhaps serving as an ornament, amulet, or 'substitute offering', was hidden under the left arm (Fig. 11.21/56 – A12).[60] Fragments of glass vessels were found in several graves in the cemetery with 240 inhumation burials at Kyjov, Hodonín District, dating to the late Migration Period.[61]

Chemical analyses

The analyses presented in this study derive from several sources. Samples from Slatiňany, Drslavice, Brno-Černá Pole, Blučina, and Žuráň were analysed by our team at the University of Chemistry and Technology Prague (UCT Prague) and the Institute of Inorganic Chemistry of the Czech Academy of Sciences in Řež. Samples from Všetuly and Držovice were provided by Pavel Fojtík from the Institute for Archaeological Heritage in Brno, and the analyses were carried out at Palacký University Olomouc (Lukáš Kučera and Pavla Kučerová). Additional analyses were cited from published and unpublished sources: Vlíněves (A3–A4),[62] Vrchoslavice (A13–A15),[63] and Praha-Zličín (A5–A9).[64] Analyses of vessels from the Čertova ruka and Vinařice sites will be published by Jaroslav Jiřík's team.

For chemical composition analysis, SEM/EDS[65] and XRF methods were employed. For SEM/EDS, miniature samples (approximately 1 × 1 mm) were carefully removed from the glass. Another ap-

55 Popelka 2024, 17–18, Fig. 4; Museum Kroměříž, Inv. no. AU 547.

56 Popelka 2024, 23, Fig. 11; Museum Kroměříž, Inv. no. AU 562.

57 Popelka 2024, 25–26, Fig. 12; Museum Kroměříž, Inv. no. AU 564.

58 Popelka 2024, 23–24, Fig. 12; Museum Kroměříž, Inv. no. AU 569.

59 Popelka 2024, 3.

60 Unpublished information by the leading archaeologist, Pavel Fojtík. The finds are held in Museum Prostějov.

61 Šmerda 2017; we are grateful for the information provided on glass.

62 Limburský *et al.* 2010, 111–168, Tab. 9.

63 Berkovec 2006, 375–376, table of analyses (data provided by V. Hulínský).

64 Jiřík *et al.* 2015, 200, table of analyses (data provided by S. Greiff).

65 Scanning electron microscopy (SEM) was used to observe glass morphology and to identify the chemical composition of the samples using energy-dispersive spectroscopy (EDS). To minimize destruction, very small samples were taken from the edges of rings and bracelets. After cleaning the surfaces from debris and corrosion, the samples were embedded in epoxy resin in a perpendicular position. They were then sanded with SiC sandpapers (grit sizes 120, 600, and 1200) and polished on a textile wheel with diamond paste (1 μm). Analyses were performed using a Jeol JSM 6510 electron microscope equipped with an Inca EDS SSD detector (Oxford Instruments) in back-scattered electron (BSE) mode, providing chemical contrast. Measurements were carried out at an accelerating voltage of 20 kV under low vacuum (30 Pa). Each reported value represents the average of three analyses with the data normalized to 100%. Reference glasses were prepared from p.a. purity chemicals (K_2O–CaO–SiO_2 and Na_2O–CaO–SiO_2) in a molar ratio of 75 mol% SiO_2, 15 mol% CaO, and 10 mol% Na_2O or K_2O. Glasses were melted from Sigma Aldrich chemicals and clean glass sand. In addition, standards (59 metal/mineral combinations) from a certified laboratory (SPI Supplies® Brand) were used. All measurements were conducted at the Institute of Inorganic Chemistry of the Czech Academy of Sciences, 250 68 Husinec-Řež.

proach involved XRF[66] analysis, where larger, uncorroded glass samples from Kostelec na Hané (A25–A26) were available and analysed in powdered form (for reference). Other instruments and methods used are detailed in the relevant publications. Each method has inherent limitations in terms of accuracy; however, we assume that the concentrations of major elements did not significantly affect the results of the applied methods and that the observed trends are reliable. The analyses are organised in Table 1 primarily by main location (Bohemia vs Moravia) and in alphabetical order within these groups. A comprehensive evaluation is provided in chapter titled 'Chemical composition and possible origin of glasses'.

Classification of vessels by form

The comprehensive collection includes a more than seventy vessels and fragments thereof, comprising several basic types. Based on body shape, beakers could be classified into two groups, those with rounded semi-ovoid and bell-shaped bodies, respectively (Fig. 2). Another group consists of cone beakers, including several variants, such as simple beakers and beakers with an everted rim (Fig. 3), Kempston and Snartemo I and II-type beakers (Fig. 4); besides, there are lamps, including lamps/beakers (Fig. 5), goblets and bowls (Figs 6–7), and bottles (Fig. 8). A special group consists of finds from Blučina and Žuráň (flute-like bottles) (Figs 9–10).

In most cases, only the form of the vessel is assessed; lamps/beakers are an exception, since in their case, shape and function overlap.

Semi-ovoid beakers

Clasina Isings classified vessels with a semi-ovoid body and an outsplayed, often unworked rim as Type 107 (Fig. 2). However, only mould-blown vessels with relief patterns and cups with coloured blobs from the 4th century AD are listed, probably products of glasshouses in the Eastern Mediterranean.[67] Numerous undecorated vessels in Western Europe, described as bowls or beakers, provide evidence for the earliest appearance of the type at the end of the 3rd century AD, with the youngest examples from the first half of the 5th century AD, with a main concentration in the 4th century AD. Undecorated vessels also include vessels with blue glass prunts.[68] László Barkóczi created Type 37b for undecorated finds from Pannonia, dating them from the 3rd to the first half of the 5th century AD (Intercisa and Csákvár, Grave 41),[69] while for vessels with blue prunts, he created a special type (67b),[70] to which he devoted special attention (see below). In connection with his study of the Danube cultural circle, Jaroslav Tejral collected information on the presence of these hemispherical vessels, including several specimens with blue prunts, at least two dozen sites in present-day Hungary, Slovakia, and Lower Austria.[71] Based on the table summarising the coin-dated examples of both variants, they occurred from the beginning of the second half of the 4th to the first decades of the 5th century AD. Vessels from Radotín and Měcholupy are also listed.[72]

66 The analyses were carried out using an ARL 9400XP+ X-ray fluorescence spectrometer. The data were subsequently evaluated with the UNIQUANT™ software, version 4. This is a standardless, semi-quantitative analytical method that, in addition to determining the concentrations of major elements, also provides information on trace elements present in the glass. The acquired data were normalised to 100%. The measurements were performed on very finely ground, uncorroded glass. The analysis was conducted in the Central Laboratories of UCT Prague by S. Randáková.

67 Isings 1957, 133–134.

68 Isings 1957, 113–114.

69 Barkóczi 1988, 76, Nos 79–80.

70 Barkóczi 1988, 37.

71 Tejral 2011, 136, 139, 146, 147, 150, 158, 178, 231, 232, 234-237, 239, 256, 258, 266, 267, 270, 274, 276, 314.

72 Tejral 2011, 276, Abb. 210.

This brings us to finds from Bohemia, where six beakers with semi-ovoid bodies are known, one of which features blue prunts. Only one comes from Moravia, namely, Drslavice (Fig. 2.20/55 – A24). In Bohemia, one complete beaker was found in Grave III in Praha-Kobylisy (Fig. 2.6/13), while only three unverified fragments of another similar beaker have been preserved in Praha-Radotín (Fig. 2.10/20). Another specimen is known from Vinařice (Fig. 2.15/28; its analysis will be published in a forthcoming study by J. Jiřík's team), and one from Praha-Zličín, Grave 15, which was described as a thimble-shaped beaker[73] (Fig. 2.17/34). A common feature of all of them, as well as of those depicted in the aforementioned work by Jaroslav Tejral, is the form of the body, with a flat or slightly concave base. None of them bears pontil marks. Their lower parts are bowl-shaped, and their rims are outsplayed, straight-cut, and unworked. They are small, 6.5–9.1 cm tall, and were made of clear, only slightly corroded, light green glass. The finds are dated to the Vinařice period.

The beaker from Měcholupy is thin-walled, 6.5 cm tall, and made of colourless glass. It bears a series of five irregular blue glass prunts with a horizontal cut line above them[74] (Fig. 2.4/11). It was found in the 1930s in a grave containing gold jewellery decorated with precious stones, typical of the Danube region, along with a *solidus* of Emperor Constantine III (407–411), dating the beaker to the first decades of the 5th century.

L. Barkóczi divided the beakers with blue prunts from Pannonia into three groups.[75] The beaker from Měcholupy belongs to Group II, with its characteristic hemispherical body and a clearly marked, short, wide lip/mouth[76] with an unworked rim. A series of several such beakers from ancient Cherson and Pantikapaion in Crimea, dated to the mid-4th to early 5th centuries AD, provide evidence for the spread of the type to the east.[77] In the west, they occur in France: undecorated vessels with blue prunts from the Mediterranean region, found in early to mid-5th century AD contexts, were classified by Danielle Foy as Group 13a–c;[78] they also form a distinct category within the Merovingian glass typology.[79]

Bell-shaped beakers

Bell-shaped beakers resemble the previous group in overall body shape, but they have an outsplayed rim (Fig. 2). However, they differ fundamentally in technical features: the rims are thickened and sealed, and some have a pontil mark on the in-turned base, indicating they were blown. Such vessels are known primarily from Graves 31, 76, 89, and 91 in Praha-Zličín (Fig. 2.17/35, 39, 42, 44); specimens from Graves 31 and 89 were described as beakers with a distinctly bell-shaped form,[80] while a beaker of the same shape with diagonal ribs from Grave 76 was described as thimble-shaped or hemispherical.[81] Given their general shape and reinforced rims, beakers from Charváty and Praha-Zličín Grave 31 are also included in this group lacking pontil marks (Fig. 2.22/57, 17/35 – A5). Four beakers are undecorated, and one bears a bundle of two to three partially sealed threads on its curved rim (Fig. 2.17/42). The body of the above-mentioned beaker from Grave 76 is

73 Jiřík 2019, 140, thimble-shaped beaker, Tab. 4.

74 The beaker is on display at the Žatec Museum and cannot be removed from the case. Therefore, it was not possible to make drawings or examine the details. Only a work photo is available, for which we thank the museum management.

75 Barkóczi 1972, 69–74.

76 Lazar 2003, 19, Fig. 6.7.

77 Kunina 1997, 337, Cat. 419–420, 422.

78 Foy 1995, 199, 227, Pl. 9.71–79.

79 Feyeux 1995, 116–117, 133, Pl. 12.T.54.6r.

80 Jiřík 2019, 142–143, Grave 31: Tab. 7.5, Grave 89: Tab. 17.14.

81 Jiřík 2019, 145, Tab. 15.6.

covered up to the rim with shallow, spirally twisted ribs, and the rim also bears a wide bundle of horizontal threads, partially sealed into the body of the vessel (Fig. 2.17/39). It was made using the pattern-blowing technique, which spread in both the East and the West from the second half of the 4th century, as Marianne Stern notes in her commentary on a similarly decorated Mayen-type beaker of North Galician provenance, dated c. 370–410 AD.[82] This technique is documented in our region on only three vessels from Praha-Zličín: in addition to the aforementioned beaker, there is a bottle from Grave 144 (Fig. 8.17/49) and a Gellep-type cone beaker from Grave 157 (Fig. 3.17/50). They have no identical analogy.

Simple cone beakers (lamps) and cone beakers with outsplayed rims

Simple, undecorated beakers with a slightly outsplayed rim and an oval edge (Fig. 3) come from burial grounds in Kolín and Praha-Podbaba. The beaker from Kolín is made of yellowish glass and has a clear pontil mark on its base (Fig. 3.2/3, 7/17). An undecorated beaker from Vlíněves, with a more distinctly flared rim, can also be assigned to this group (Fig. 3.16/32). Clasina Isings classified the shape as Form 106, cone beakers or lamps with several variants. Our specimens correspond to Variant 106c, which has been found in burial grounds in France, Belgium, the Netherlands, and Germany, in contexts dating from the second half of the 4th to the 6th century.[83] One beaker from this group has pre-blown diagonal ribs. It is taller, slender, and has a solid, flat base and an outsplayed rim. The ribs start beneath several rows of threads at the mouth (Fig. 3.17/50). Cone beakers, referred to as the Gellep type, sometimes up to 19 cm tall, were widespread mainly along the Lower and Middle Rhine, with isolated specimens in Belgium and France. They appear in graves from the mid-5th century AD, with a larger number in its second half and late decades, while the latest examples date to the early 6th century AD.[84] The specimen in focus, the only one outside this area so far, can be safely interpreted as an import from the Rhine region.[85]

Cone beakers with outsplayed rims come from Grave 195 in Vlíněves and Graves 37, 78, 94, and 129 in Praha-Zličín. Four beakers from Zličín bear distinct decoration in the form of single or multiple arcs on the body. One beaker from Vlíněves features a bundle of fine lines below the rim (Fig. 3.16/31 – A3), while two from Praha-Zličín also have fine lines on the lower part of the body (Fig. 3.17/40 – A6, 17/46 – A7). Their bases are concave, with only one bearing a pontil mark. They are made of colourless or greenish glass, with only one deep green glass specimen, the one from Grave 129 in Praha-Zličín (Fig. 3.17/47).[86] Such beakers in Bohemia are known only from burial grounds dating to the Vinařice phase. Based on the similarity of decoration, Jaroslav Jiřík places an incomplete beaker from Grave 37 (Fig. 3.17/36) and a small bottle from Grave 90[87] (Fig. 8.17/43 – A8) in the group of vessels decorated with a relief garland. The beaker from Grave 129, made of distinctly green glass and featuring two rows of simple wavy lines, is similar to the one from Grave 78, made of colourless glass, and the beaker from Vlíněves; they are thought to be analogous to a specimen from a grave in Fürst, dating from the second third of the 5th century AD (Fig. 3.17/47, 17/40 – A6, 16/31 – A3).[88] However, the rich green colour of the glass and the simple wavy pattern of the beaker from Fürst correspond to the design of a vessel from Grave 129,[89] or possibly a lower beaker from

82 Stern 2001, 342, Cat. 31 and 190.

83 Isings 1957, 126–129.

84 Koch 1987, 83–86, Abb. 31.

85 Jiřík 2019, 149–150, Tab. 32.8.

86 Jiřík *et al.* 2015, 191 top row right.

87 Jiřík 2019, 143–144, Grave 37: Tab. 8.2, Grave 90: Tab. 17.12.

88 Jiřík 2019, 145, Tab. 26.1a, 15.7; Jiřík *et al.* 2015, 191, top row centre and right.

89 Tejral 2011, 238, Abb. 181.1, 2, 312, Abb. 240.

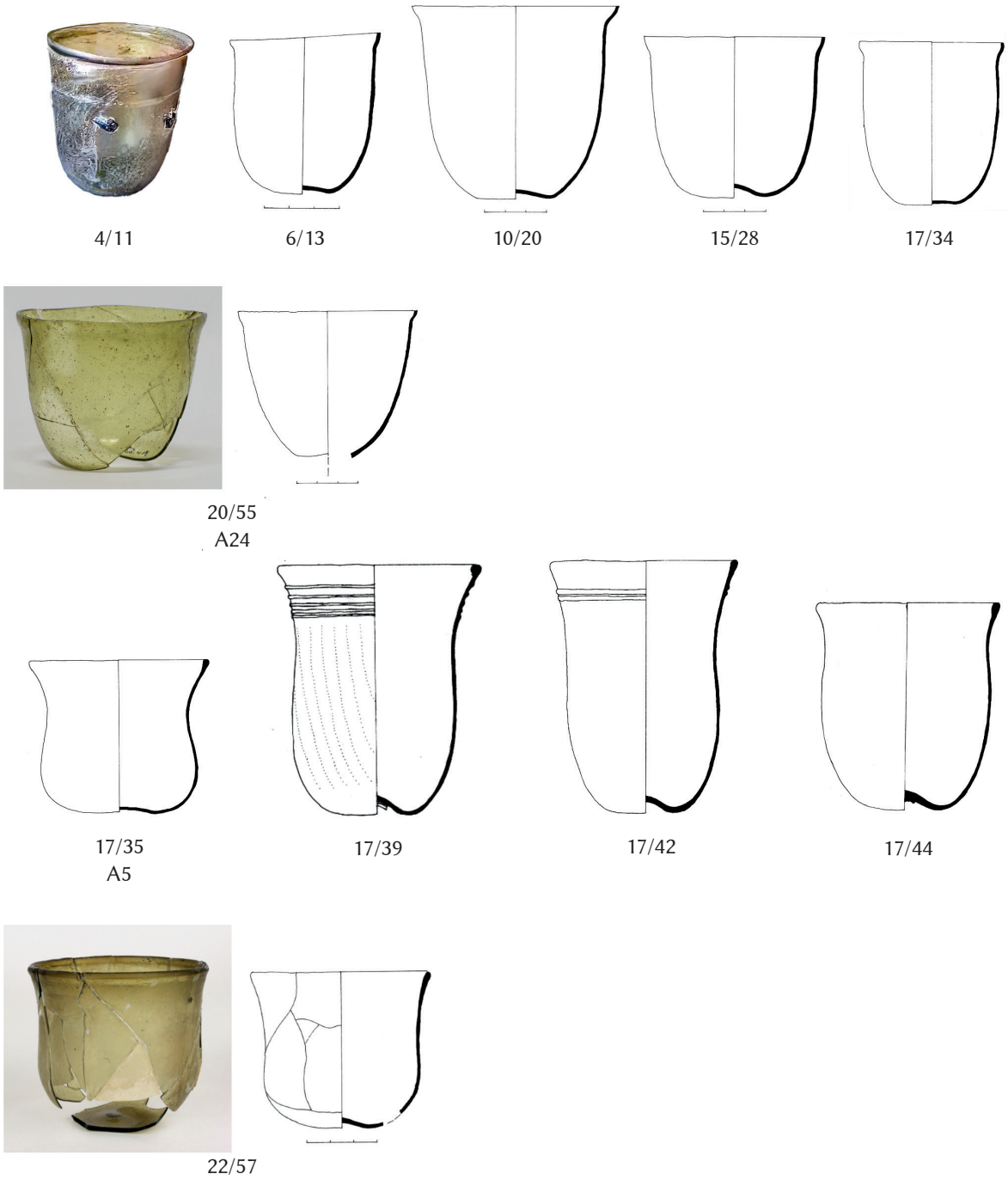


Fig. 2. Bell-shaped beakers. 4/11 – Měcholupy, photo Museum Žatec, 6/13 – Praha-Kobylisy, Grave III, 10/20 – Praha-Radotín, 15/28 – Vinařice, 17/34 – Praha-Zličín, Grave 15 (after Jiřík 2019, Tab. 4.1), 20/55 – Drslavice (restoration: Tereza Malínková, photo: Vít Klouček), 17/35 – Praha-Zličín, Grave 31 (after Jiřík 2019, Tab. 7.5), 17/39 – Praha-Zličín, Grave 76 (after Jiřík 2019, Tab. 15.6), 17/42 – Praha-Zličín, Grave 89 (after Jiřík 2019, Tab. 17.14), 17/44 – Praha-Zličín, Grave 91 (after Jiřík 2019, Tab. 17.13), 22/57 – Charváty (photo VM Olomouc, drawings by Hedvika Sedláčková, technical preparation by Anne-Marie Rohanová and Karolína Pánová).

Zeiselmauer[90] and one from Grave 28 in Linz-Tiefen Graben.[91] In Pannonia, L. Barkóczi classified beakers with arc decoration from Brigetio, Várdomb, and Intercisa as Group 62, a variant of the

90 Tejral 2011, 264, Abb. 199.

91 Tejral 2011, 268, Abb. 203, top row centre.

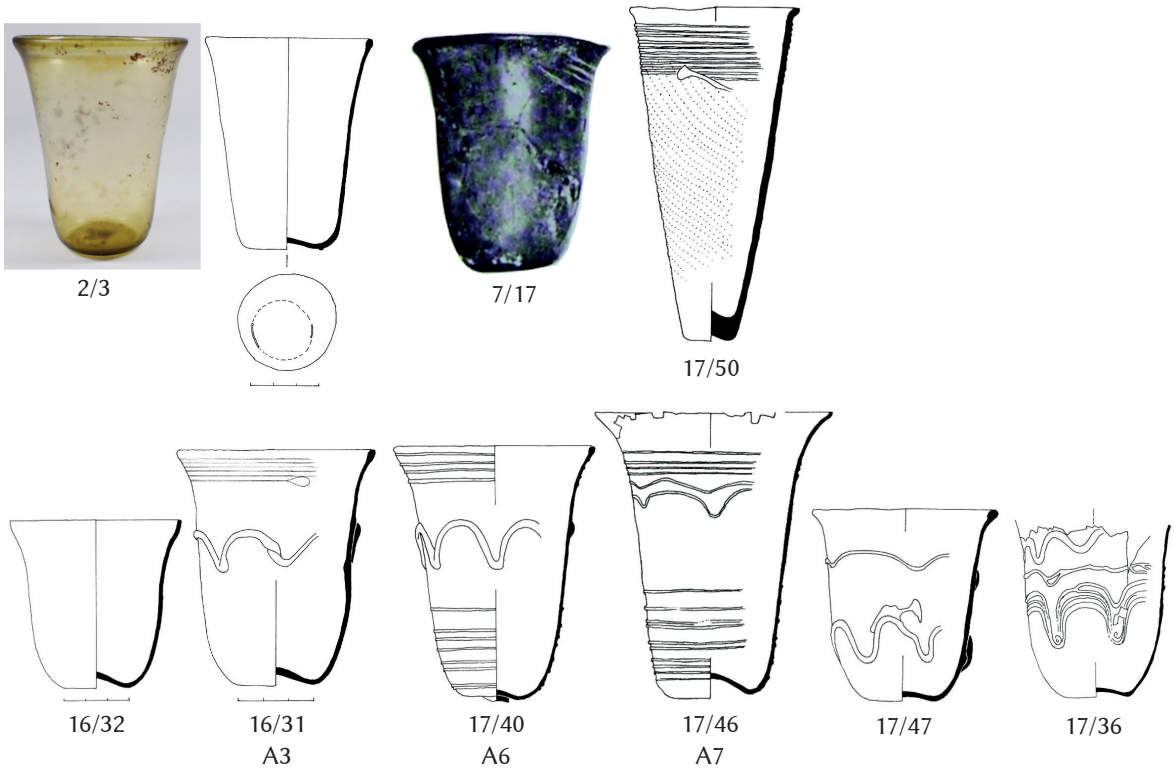


Fig. 3. Simple cone beakers (lamps) and cone beakers with outsplayed rims. 2/3 – Kolín-Gasworks (photo M. Kolín), 7/17 – Praha-Podbaba (after Svoboda 1965, Tab. 28.5), 16/32 – Vlíněves grave?, 16/31 – Vlíněves, Grave 195, 17/50 – Praha-Zličín, Grave 157 (after Jiřík 2019, Tab. 32.8), 17/40 – Praha-Zličín, Grave 37 (after Jiřík 2019, Tab. 15.7), 17/46 – Praha-Zličín, Grave 94 (after Jiřík 2019, Tab. 18.6), 17/47 – Praha-Zličín, Grave 129 (after Jiřík 2019, Tab. 26.1), 17/36 – Praha-Zličín, Grave 37 (after Jiřík 2019, Tab. 8.2) (drawings by Hedvika Sedláčková, technical preparation by Anne-Marie Rohanová and Karolína Pánová).

undecorated beakers described as Group 37b, and compiled a list of such vessels found on other sites in the province.[92] He classified white opaque glass beakers with a similar design and multiple arcs, probably from Brigetio, as Group 63. All variants are dated from the last third of the 4th century to the first decades of the 5th century AD.

Similarity extends only to the decoration, while differences can be observed in vessel shape. Such beakers in Bohemia are generally taller, conical, and have thickened, sealed rims, similar to those with arc bundles from Fürst and Brigetio. However, vessels in Barkóczi's Group 62, i.e., the beakers from Zeiselmauer and Linz, have bowl-shaped, straight-cut, unworked outsplayed rims; this variant has been assigned to the same horizon as Gellep-type beakers, indented bowls, and hemispherical undecorated beakers, including those with blue prunts.[93]

Kempston-type cone beakers

Two complete specimens and body fragments with the characteristic thread decoration (Fig. 4) have been found in graves at three sites in Bohemia. A complete beaker was recovered from Grave IV and a fragment from the upper part of the body of another from Grave I in Praha-Kobylisy (Fig. 4.6/14, 15). A complete beaker from Praha-Veleslavín was destroyed and is known only from a published photograph (Fig. 4.8/18). Bedřich Svoboda mentions finds of pottery fragments, dating

92 Barkóczi 1988, 93, Taf. 12.134,135.

93 Tejral 2011, 274, Abb. 208 with further literature.

to this period, from an uncertain settlement context in Čertova ruka hillfort near Mašov, but only Vera Evison included these fragments in her catalogue of Kempston-type beakers.[94] A reassessment of the find concluded that only one fragment could belong to such a beaker (Fig. 4.1/1), while the remaining four fragments probably originate from a bowl-shaped vessel (Fig. 7.1/2a–c). The complete beaker from Praha-Kobylisy and probably another specimen from Praha-Veleslavín belong to the tall, slender variant with a height-to-mouth diameter ratio of 3:1 (26.8:9.5 cm).[95] These elegantly shaped beakers, named after the eponymous site in eastern England, are characterised by a tall conical body with a slightly outsplayed rim and a base without a foot. They are usually made of thin-walled, mostly light green glass, but some, such as the fragment from Praha-Kobylisy Grave I, were made of brownish glass. The upper part below the rim is densely wound with fine threads, and the body has a tall wavy pattern. The beaker from Grave IV in Praha-Kobylisy features a bundle of 26–27 horizontal threads and 14 wavy lines, as well as remnants of a distinct adhesive residue and evidence of a blowpipe on its base. Altogether, 53 complete vessels of this type have been found in graves: 23 in England, 20 in Germany, two in the Netherlands, and four in France. Save for a single specimen in Denmark, there are none in Scandinavia. Two examples in Belgium were later joined by another five.[96] The list of countries where these vessels have been found indicates a distinctly West European type, presumably manufactured somewhere in what is now northern France and Belgium. Such beakers in England occur in contexts dating from the mid-5th to the mid-6th century AD and later; however, they were likely not manufactured there until after AD 525.[97] Ursula Koch assigns such vessels from German regions to the inventory dating from the second half of the 5th to the beginning of the 6th century AD.[98] Finds from Bohemia were generally dated to the same period (the end of the 5th or the beginning of the 6th century AD).[99]

Snartemo-type cone beakers

Kempston-type cone beakers found in Bohemia mark the eastern boundary of their occurrence, and the number of known specimens has not changed over the last century. However, the group of visually similar cone beakers, representing the Snartemo type (Fig. 4),[100] has grown significantly. The fundamental difference between the two types lies in their base forms. The first Snartemo-type beaker in Bohemia was found in an inhumation grave from Vinařice phase in Tišice, in 1912 (Fig. 4.13/25). The shape, unusual among the glass vessels known in Bohemia at the time, earned Bedřich Svoboda's special attention.[101] In 1987, it was still the only specimen from Bohemia and one of the ten such beakers known altogether: four were known from Germany, three from present-day Poland, and one each from France and Belgium[102] (although later, the number of specimens in Belgium grew to three).[103] However, most examples came from Scandinavia.[104] In Western Europe, this variant was clearly less common than the Kempston type.

94 Evison 1972, 63, no. 53.
95 Evison 1972, 48.
96 Whitehouse 2001, 149–151, Cat. 667.
97 Evison 1972, 62.
98 Koch 2008, 158–159, Abb. 22.3.
99 Svoboda 1965, 111.
100 Rademacher 1942.
101 Svoboda 1965, 110.
102 Koch 1987, 113, 114, Abb. 45.
103 Alenus-Lecerf 1995, 58, 71, Fig. 1.5.
104 Hunter – Sanderson 1982, 25.

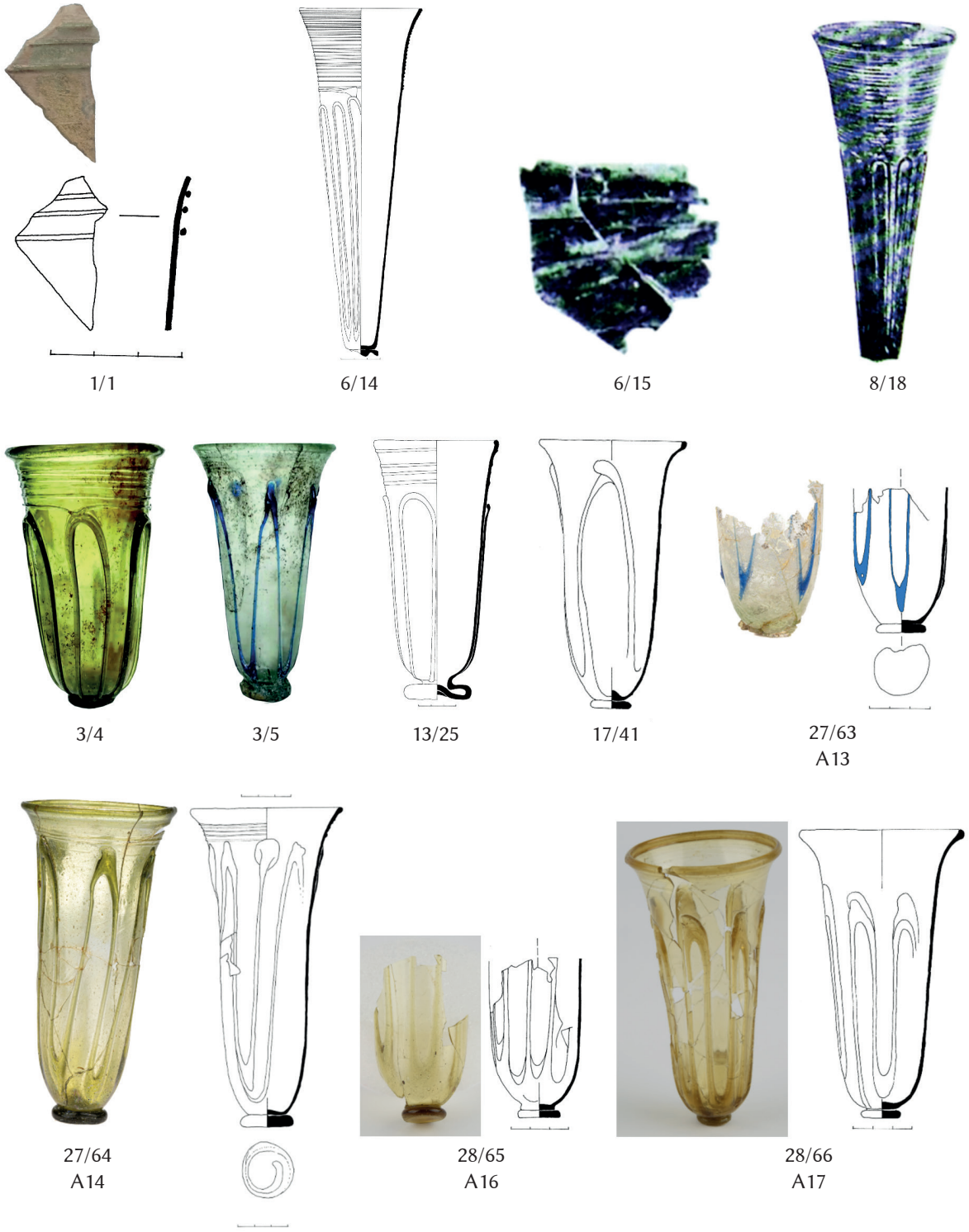


Fig. 4. Kempston and Snartemo cone beakers. 1/1 – Čertova ruka hillfort (photo: J. Prostředník, M. Turnov), 6/14 – Praha-Kobylisy, Grave IV, 6/15 – Praha-Kobylisy, Grave I, not found (after Svoboda 1965, 111, Tab. 28.3), 8/18 – Praha-Veleslavín, destroyed (after Svoboda 1965, Tab. 28.11), 3/4 and 3/5 – Kozel near Beroun, 13/25 – Tišice near Mělník, 17/41 – Praha-Zličín, Grave 87 (after Jiřík 2019, Tab. 17.3), 27/63 – Vrchoslavice, Grave 7 (unpublished), 27/64 – Vrchoslavice, Grave 9 (unpublished), 28/65 – Všetuly, Grave 500/800 (unpublished), 28/66 – Všetuly, Grave 507/807 (unpublished) (drawings by Hedvika Sedláčková, technical design by Jan Musil, Anne-Marie Rohanová, and Karolína Pánová, 1/1 photo: Jan Prostředník, 27/65 photo: Marek Gerhard, 28/ photo Andrea Šindlerová).

The beaker from Tišice allegedly lay under the head or across the neck of the deceased.[105] Almost a hundred years later, another specimen was found in Bohemia in a niche above the head in Grave 87 in Praha-Zličín (Fig. 4.17/41); it was identified as a chalice-shaped beaker of the Barshalder/Prša/Kapušany type.[106] Currently, vessels from Vrchoslavice and Všetuly in Moravia can also be assigned to this group. Further study of the subject should seek to explain the occurrence of identical vessels at sites thousands of kilometres apart: in Barshalder in Gotland,[107] Praha-Zličín, Moravia, Slovakia, and Romania. In 2022(?), two beakers were found in a 'treasure trove' at the Kozel hillfort (Fig. 4.3/4, 5).

Currently, four specimens from two burial sites are known from Moravia. Two vessels come from a small inhumation burial site in Vrchoslavice (Fig. 4.27/63 – A13, 27/64 – A14): A fragmentary and a complete beaker were found in niches above the head in two graves at Všetuly. (Fig. 4.28/65 – A16, 28/66 – A17). New finds expanded the distribution area of the type towards the east and south-east. Based on finds in Slovakia, Romania, and Moravia, it was classified as the Kapušany–Prša–Ghenci–Vrchoslavice type, considered to be the product of a late Roman glassmaking centre in the area.[108] Vessels from Praha-Zličín and Všetuly may now also be assigned to this type. The differences between the beaker from Tišice and the others listed below fully justify the separation of a special group and corroborate the hypothesis of a different production centre.

Altogether, eight specimens from Bohemia and Moravia must be compared. All have a slightly conical body that gradually widens into an outspread rim and a narrow disc base. They are significantly shorter than the slender Kempston-type beakers, which have a height-to-rim diameter ratio of 3:1. In contrast, the ratio of height to rim diameter of the vessels from Tišice, Vrchoslavice, and Všetuly is approximately 2:1.[109] Most beakers feature several rows of threads beneath the outsplayed rim, partially sealed into the body. Apparently, only the beaker from Zličín lacks such threads.

The fundamental difference between the beaker from Tišice and the others is evident at first glance: production technique. The beaker from Tišice was made from a single piece. The broken bottom shows that the base was formed from the lower part of the body: it was pinched, stretched, folded, and slightly pressed inwards to create a base which appears to be a solid disc vase from the outside but is actually hollow inside. Such folded feet are known from goblets.[110] Beakers from Vieuxville,[111] likely from Spontin/Belgium, and Lilla Bjägers/Gotland,[112] and probably the single-colour beaker that resembles the one from Tišice at the Kozel hillfort (Fig. 4.3/4) were also made using this technique. The finds from a glass workshop at Macquenoise, Belgium, show that it also produced Snartemo-type beakers, which, based on illustrations, were apparently made from two parts.[113]

All other vessels in our collection consist of two parts: the body, to which a thick spiral thread was attached and then pressed to form a base. Traces of the twisted thread are clearly visible on the beaker from Grave 9 in Vrchoslavice (Fig. 4.27/64 – A14). On the beaker from Tišice, the threads on the body form a wavy line bundle of six and run regularly towards the bottom without any trace of connection. The complete beaker from Vrchoslavice features seven wavy lines, whereas the beaker

105 Svoboda 1965, 275.

106 Jiřík 2019, 146, Tab. 17.3.

107 Chambon – Arbmann 1952, 226–227, Fig. 10.2.

108 Adamíková 2020, 61; Tejral 2011, 45.

109 Beaker from Tišice is 21.2 cm tall, with a rim diameter of 10.2 cm; the beaker from Vrchoslavice, Grave 9, is 19.5 cm tall and has a rim diameter of 9.2 cm, and the one from Všetuly is 15.5 cm tall with a rim diameter of 8.5 cm.

110 Stern 2001, 30.

111 Alenus-Lecerf 1995, 71, Fig. 1.5.

112 Chambon – Arbmann 1952, 266–267, Figs 9 and 10 left.

113 Chambon – Arbmann 1952, 214, Fig. 4.15, 221, Fig. 6.

from Praha-Zličín has only four. Each thread on the upper parts of the beakers from Vrchoslavice and Všetuly, and on the specimen from Praha-Zličín, is attached to the top of an arc with a distinct drop of glass; they were pulled downwards vertically and curved back upwards above the base.[114]

The beaker from Tišice is made of light green glass; its shape and colour most closely resemble those of a beaker from the Kozel hillfort (Fig. 4.3/4). The beaker from Grave 9 in Vrchoslavice, both beakers from Všetuly, and the beaker from Grave 87 in Praha-Zličín were made of yellowish/honey-coloured glass.

However, two beakers—one from the Kozel hillfort and the one from Grave 7 in Vrchoslavice—were made of colourless glass and with blue wavy lines (Fig. 4.3/5, 27/63 – A13). Such a contrast—a colourless body and tall blue waves—is only known from a lamp/beaker with a rounded bottom from Trebur.[115]

The Czech and Moravian finds belong essentially to the same period. The grave in Tišice was assigned to the Vinařice phase,[116] the grave in Vrchoslavice to the mid-5th century AD,[117] and the specimen from Všetuly roughly to the 5th century AD.[118]

The material of five specimens from this group was analysed. However, Jaroslav Jiřík has not yet published the results of the Kempston-type beaker from Čertova ruka; therefore, it cannot be compared with the four Moravian specimens of the Snartemo-type beakers from Všetuly (A16, A17) and Vrchoslavice in Moravia (A13, A14) to build on the work of John Hunter and David Sanderson.[119]

Lamps

A simple conical vessel from Vinařice has straight walls, a small flat base without a disc, a slightly bowl-shaped mouth, and a straight-cut, unworked rim; it is 13.6 cm tall and has a rim diameter of 8.1 cm (Fig. 5.15/27). It was made of clear olive-green glass[120] (Fig. 5). A sharp remnant of an incomplete break is preserved in one area of the upper part of the rim.

Such vessels served primarily as lamps (Isings 106a), as evidenced by decorated specimens from the Eastern Mediterranean[121] and Pantikapaion in Crimea.[122] Their origin is generally traced to the Syrian-Palestinian region or to Egypt in the 4th or possibly the 5th century AD. L. Barkóczi classified undecorated specimens from Pannonia as Group 47c, cone beakers with a small base (either flat or concave). Examples are known from cemeteries at Ságvár, Kisárpár, Intercisa, Aquincum, Lepsény, and Majs, dating from the second half of the 4th to the first decades of the 5th century AD.[123] Two lamps with blue prunts, dating from the second half of the 4th century AD, are also known from Pannonia (from Intercisa and Ságvár, respectively).[124] They are exceptional in Europe, especially the

114 Jiřík *et al.* 2015, 205, centre.

115 Maul 2002, Vol. II, 478, Taf. 74.6.

116 Svoboda 1965, 110 and 299, no. 55.

117 Berkovec 2006, 5.

118 Popelka 2024, 3.

119 Hunter – Sanderson 1982.

120 Jiřík *et al.* 2015, 184, above.

121 Stern 2001, 294–295, Cat. 158, with further examples. The commentary highlights the slightly concave, arched mouth with a straight-cut (unworked) rim.

122 Kunina 1997, 339, Cat. 424.

123 Barkóczi 1988, 82–84, Taf. 9.100–103.

124 Barkóczi 1972, 74–76.

lamp from Ságvár, due to its engraved Greek inscription and grape motifs.[125] Decorated examples of the same type include a lamp probably from Brigetio with arcs made of white opaque glass.[126]

Lamps/Beakers

The possibility that the vessels with a tall, almost cylindrical body, an outsplayed mouth, and a sealed rim served as lamps (Fig. 5) was already suggested in connection with the vessel with a protrusion at the bottom (a pointed base) from Grave 93 at Praha-Zličín (Fig. 5.17/45).[127] Later, another find corroborated this hypothesis: a vessel from Grave H3 in Slatiňany, the burial of a warrior interred with a sword. That vessel has a rounded bottom with an olive-green pontil mark (Fig. 5.12/23 – A1).

Other vessels of the type from Bohemia and Moravia have been discussed in detail in connection with this specimen,[128] thus they are only mentioned briefly here. Currently, eight examples are known, seven from Bohemia and one from Moravia. They belong to a broad type group of cone beakers or lamps, appearing from the late 4th century onwards; Clasina Isings classified them as Group 106 with Variants a–d. Our specimens belong to the true conical variant (Isings 106d), with either a rounded bottom or a pointed base, and are shaped differently in the eastern and western parts of the empire. During the 5th century AD, this shape became typical of Frankish glass and remained in production in the 6th century AD.[129]

Both variants have been found in Bohemia: those with pointed bases were found in graves in Radonice nad Ohří (Fig. 5.9/19), Grave 188 in Vlíněves (Fig. 5.16/30 – A4), Grave 93 in Praha-Zličín (Fig. 5.17/45), and one in the 'treasure' discovered in the Kozel hillfort (Fig. 5.3/6). Such a beaker in Moravia is known only from Vrchoslavice (Fig. 5.27/62 – A15). Examples of the rounded-bottom variant have been recovered from Graves 10 and 49 in Praha-Zličín (Fig. 5.17/33, 17/37) and from Slatiňany (Fig. 5.12/23 – A1).

Brigitte Maul studied the type in detail and described it as *Breite Längliche glockenförmige Becher mit Bodenspitze und Rundboden.*[130] She collected 79 specimens from Western Europe, including a vessel from Radonice,[131] and listed several sub-variants that are sometimes difficult to distinguish. The body of the vast majority of such vessels is covered by simple or multiple arcs made of white opaque glass, combined with spiral threads around the lower part of the body and the rim. A vessel from Radonice—which, at the time of discovery, was an isolated find on the eastern periphery of the distribution area of the type—counts as a less common specimen with a decoration made of the same glass as the body. The type is dated approximately to the 5th to 6th centuries AD. Based on the co-occurrence of such vessels and much more numerous and younger bell beakers and palm cups—which are absent from the study area—B. Maul identified 27 micro-regions mainly in the area along the border between France and Belgium, and classified the Radonice specimen as a local variant. Only with the number of finds in Bohemia and Moravia increasing recently to eight could the area be described as a separate micro-region, no. 28 (Fig. 1). Most specimens (38) were found in France and only five in Belgium; discoveries concentrate in the area of the border of the two countries (Micro-regions 17, 19, 20, and 21), where the only documented glass workshop to produce such beakers/lamps is also located. Only 21 specimens are known from sites in Germany, a few from the

125 Barkóczi 1972, 74, Fig. 4.1,2.

126 Barkóczi 1988, 94, Taf. 13.137.

127 Jiřík *et al.* 2015, 18 below; Jiřík 2019, 147, Tab. 18.1.

128 Jílek *et al.* 2025, 312–315.

129 Isings 1957, 126–131.

130 Maul 2002, Vols I–II.

131 Maul 2002, Vol. II, Taf. 72.4, Liste 9.5.

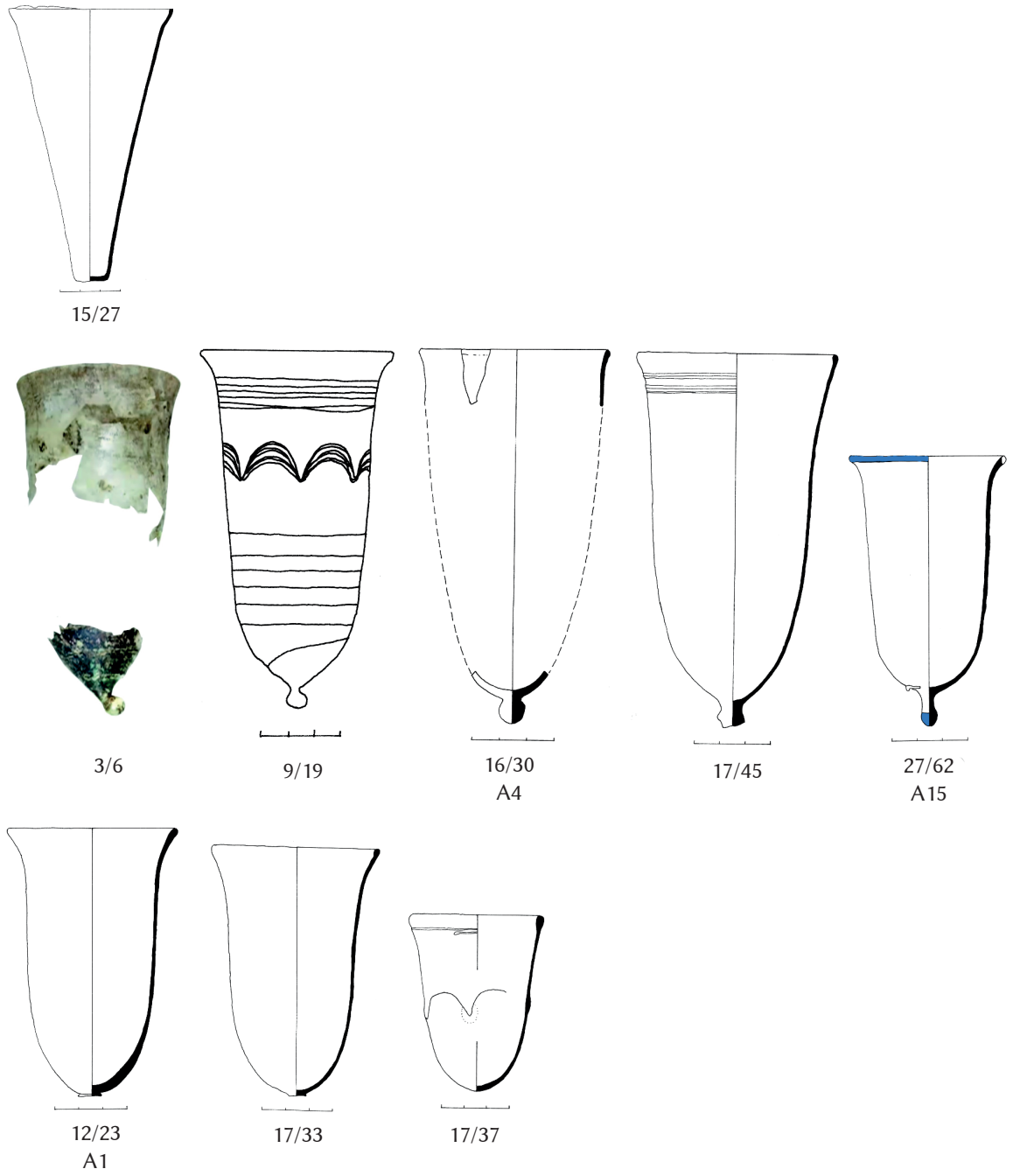


Fig. 5. Lamps and lamps/beakers. 15/27 – Vinařice, 3/6 – hillfort Kozel near Hostim Beroun District, 9/19 – Radonice nad Ohří (after Maul 2002, Vol. II, Taf. 72.4), 16/30 – Vlíněves near Mělník, Grave 188 (after Limburský *et al.* 2010), 17/45 – Praha-Zličín, Grave 93 (after Jiřík 2019, Tab. 18.1), 27/62 – Vrchoslavice, Grave 6, 12/23 – Slatiňany, Grave H3 (after Jiřík *et al.* 2015, 29, Fig 14.6), 17/33 – Praha-Zličín, Grave 10 (after Jiřík 2019, Tab. 3.3), 17/37 – Praha-Zličín, Grave 49 (after Jiřík 2019, Tab. 11.5) (drawings by Hedvika Sedláčková, technical design by Anne-Marie Rohanová and Karolína Pánová).

Netherlands and Switzerland, and one each from Italy and Great Britain.[132] Importantly, only occasional finds or none at all are known from regions adjacent to or near the Czech Basin: Micro-region 11, corresponding to Thuringia, which has close ties to the material culture of Vinařice,[133] is generally

132 Maul 2002, Vol. II, 474–478.

133 Tejral 2016, 117, Abb. 5.C,D.

poor in glass vessels and, so far, completely devoid of the type in question; only a few examples are known from Micro-regions 9 and 10, i.e., Alemannia and Bavaria. The beaker/lamp from Grave 38 in Hemmingen bears a simple blue thread,[134] resembling the vessel from Grave 93 in Prague-Zličín with a thread made of the same glass as the body (Fig. 5.17/45). Vessels from the studied region generally lack white opaque glass decoration and, except for the specimen from Radonice, also arcs, while blue glass threads appear only in the beaker/lamp from Vrchoslavice (Fig. 5.27/62 – A15).

Brigitte Maul consistently refers to these vessels as beakers, and other Western European researchers, such as Danielle Foy, tend to describe both variants as goblets and date them to AD 450–530/540 and 560.[135] In southern Europe, however, vessels of this shape are considered lamps. Cylindrical vessels with small knobs from Thessaloniki are dated to the early 5th and 6th centuries AD; their numerous parallels provide evidence of their use in early Christian churches.[136] Vessels with pointed bases were among the most common shapes in Serbia and Kosovo in the second half of the 5th and in the 6th century AD;[137] they were also used as lamps in early Christian churches in Italy.[138] Incidentally, vessels of the same shape were still produced and used as lamps in Venice around 1500.[139] The wide distribution area and long life of the type suggest production by multiple workshops; one of them, operating during the Migration Period, was probably the glass workshop in Macquenoise, Belgium.[140]

The original purpose of these conical vessels was a subject of prolonged scholarly debate. Conclusive analogies in southern European countries point to their use as lamps in church candelabra (i.e. oil vessels). Furthermore, as described above, these vessels were placed in niches above the deceased's heads in graves. Remains of both vegetal and animal oils were identified on the inner surface of the vessel from Slatiňany.[141]

Goblets

In Roman times, stemmed goblets made of a single glass bulb (Fig. 6) were a distinctly Mediterranean type. The stem and foot were created by pinching and shaping the lower part of the half-finished cup. Clasina Isings classified them as Form 111, noting that slightly different goblets with partially hollow stems were found in Cyprus.[142] The shape survived into the early Middle Ages, although the cup form and the stemmed foot were applied separately.[143] The method of making folded stemmed feet is thought to have originated in Syria or Palestine in the mid-5th century AD and to have spread in Late Antiquity, particularly with goblets, throughout the Mediterranean and eastern Byzantine territory.[144] In Europe, at least two variants of these goblets were found in large numbers in Greece, Bulgaria, present-day Italy, and southern France between the 5th and early 7th centuries AD.[145] Numerous finds also come from museum collections, where they are listed as products from

134 Maul 2002, Vol. I, 111, 115; Maul 2002, Vol. II, Liste 9.12, Taf. 73.2.

135 Foy 1989, 130–131, Group V.4.422,423.

136 Antonaras 2017, 74–75, Type 33, Cat. 123–129, Pl. 5.5, Note 648.

137 Križanac 2016, 100–103.

138 Uboldi 1995, 119–120, Typ III.2.

139 E.g., Barovier Mentasti 2006, 48, Fig. 17, Murano 1500–1520, Fig. 18; Jesus in the Temple by Vittorio Carpaccio, 1510.

140 Chambon – Arbmann 1952, 212, Fig. 3.4.

141 Jílek *et al.* 2025, 319.

142 Isings 1957, Forme 111, 139–140; Vessberg 1952, Pl. 4.17a,18, 124.

143 Isings 1957, Forme 111, 140.

144 Stern 2001, 30.

145 Antonaras 2017, 82–87; Sternini 2001.



19/54
A23



28/68
A18

Fig. 6. Goblets. 19/54 – Brno-Černá Pole (restoration by Tereza Malínková, photo by Vít Klouček), 28/68 – Všetuly, Grave 510/810 (photo by Andrea Šindlerová, drawings by Hedvika Sedláčková, technical design by Anne-Marie Rohanová and Karolína Pánová).

the eastern Mediterranean from between the 4th and 6th[146] or the 5th and early 7th centuries AD,[147] or dated to the 6th to early 7th centuries AD.[148]

North of the Alps, this shape was very rare. For a long time, only six specimens were known from there (including the find from Brno-Černá Pole; see Fig. 6.19/54 – A23).[149] Later, another specimen

146 Whitehouse 2001, 117–118, Cat. 616–617.

147 Antonaras 2012, 139–140, Cat. 192–194.

148 Stern 2001, 309–311, Cat. 172–174.

149 Harden 1975, 23, no. 3; Whitehouse 1997, 103–104, no. 154.

was published from a Migration Period burial ground in Čataj, Slovakia,[150] a disc-shaped foot fragment[151] was found in the grave of a woman from the same period in Bratislava–Podunajské Biskupice, and recently another vessel has been reported from Všetuly (Fig. 6.28/68 – A18).

The goblets from Brno-Černá Pole and Všetuly are exceptional in their own way. The goblet from Brno-Černá Pole was made from a single glass bulb. It has an egg-shaped body with an outspread mouth and a sealed rim, and the body sits directly on the inwardly pressed foot disc. It was made of colourless glass with a blue-green hue; its wall is extremely thin. It features several rows of white, opaque glass threads around the rim, neck, and body, some of which were preserved only as imprints. It is 9.3 cm tall and has a rim 5.6 cm in diameter. It is the second vessel of this type of glass to be found in the study area; the first, a bowl from Praha-Bubny, is missing. The goblet was found in the grave of a child with a deformed skull, dated to the second half of the 5th century AD.[152]

The goblet from Všetuly is striking primarily for the hue of the glass and the combination of purple and dark cobalt blue. Purple glass was particularly popular in Syria from the end of the 3rd to the mid-4th century AD, used for luxury tableware.[153] It was very rare in Europe: for example, Birgit Maul notes that 'red' glass of varying intensity (including purple, apparently) is the second least common colour in the early medieval glass record (after deep blue).[154]

As for the applied technology, the goblet was assembled from two parts: a folded, hollow stem with a disc-shaped foot was attached to the smooth cylindrical body with a slightly outsplayed rim and a sealed edge. When viewed from the side or from below, the rounded, smooth bottom of the goblet is visible within the hollow stem. However, the exact production process remains unclear. The goblet is 10.6 cm tall, with a rim diameter of 7.2/7.5 cm. The grave is dated to around the 5th century AD.

This goblet looks similar to one from Grave 21 in Čataj, Slovakia, dated to the second third or second half of the 5th century AD. That vessel has thin ribs on its body and a spherical protrusion on the stem; however, based on the published drawing, it is not possible to determine whether it was made in one or two parts.[155]

Bowls

Only three or four bowls are known from Bohemia (Fig. 7). One has been preserved only in a detailed description by Bedřich Svoboda: it was made of green glass, had a wide-open mouth, and a hemispherical body covered with bundles of asymmetrical waves with protruding diagonal spikes (arcades) made of white opaque glass. It came from a grave in Praha-Bubny, probably from the end of the 5th or beginning of the 6th century AD and it only 'exists' in Svoboda´s publication.[156] Wide bowls were an important type of tableware in the 5th century AD; they were decorated using a variety of techniques. The bowl from Bubny belongs to a group decorated with attached white opaque threads. The popularity of this decoration on bowls increased in the second half of the 5th century AD, particularly popular in the Meuse region.[157]

150 Zábojník 2009, Fig. 3.5.
151 Adamíková 2020, Cat. 4.
152 Hochmanová 1952.
153 Stern 2001, 146.
154 Maul 2002, Vol. I, 97–100.
155 Zábojník 2009, 190, Fig. 2.6.
156 Svoboda 1965, 111.
157 Koch 2008, 158–159, Abb. 21.6.

Some fragments from the Čertova ruka hillfort, originally considered to be part of a Kempston-type beaker, likely also belong to such a bowl. A repeated investigation of the finds has revealed that the largest fragment comes from the outsplayed, inward-cut, and sealed rim of a vessel with a bundle of four diagonal threads and arcs below them—the top of one arc is visible on the rim fragment, while other parts appear on the body fragment (Fig. 7.1/2a–c; the respective analysis will be published in a forthcoming study by J. Jiřík's team).

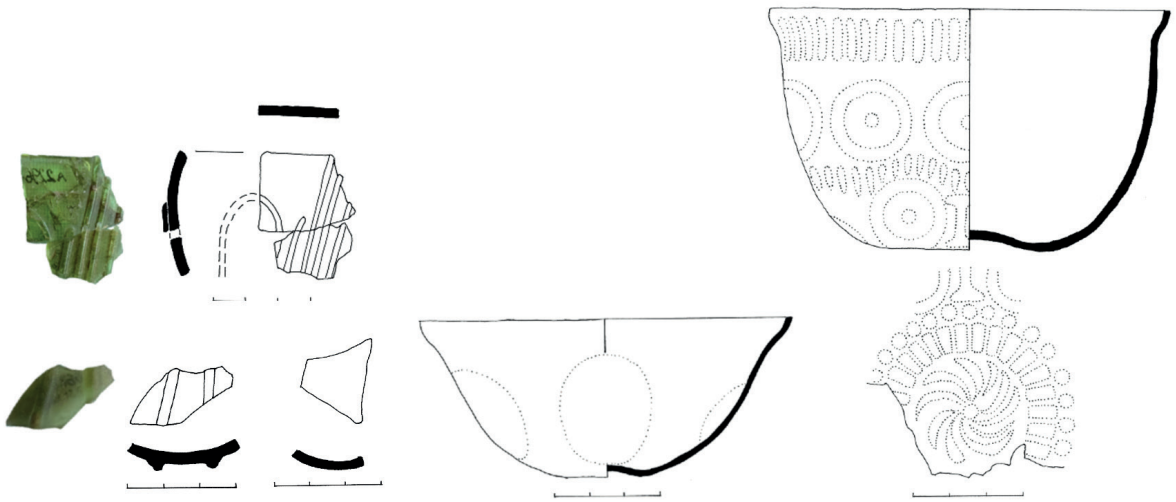


Fig. 7. Bowls. 1/2a–c – Čertova ruka hillfort (M. Trutnov), 14/26 – Úherce near Louny, 15/29 – Vinařice (drawings by Hedvika Sedláčková, photo by Jan Prostředník, technical design by Karolína Pánová).

A small indented conical bowl from a Vinařice-phase grave at Úherce near Louny was made of olive-green glass and bears traces of corrosion process. It has six indentations on its body, a concave bottom, a slightly outsplayed rim, and a cut edge. It is 4.5 cm tall and has a rim of 10.7 cm in diameter (Fig. 7.14/26). Indented conical bowls (Isings Form 117) are a late Roman period glassware type used especially in Western Europe. They appeared sporadically as early as the end of the 3rd century, but most of the numerous known specimens date to the 4th century AD.[158] Several variants were distinguished[159] based on slight differences in the shape of the body. The bowl from Úherce was identified, together with 25 other specimens, as '*kalottenförmig*' ('dome-shaped'); its closest parallel is known from Carnuntum.[160] Dated finds of this variant from the Rhine region and Emona, the seat of the bishop at that time, come from the second quarter to the second half of the 4th century AD; however, finds from Augst have been dated to ca. AD 350–450,[161] the upper limit corresponding to the dating of the bowl from Úherce.

Of the last bowl, from Vinařice, only a few larger and smaller fragments have survived. It was made of glass with a rich green hue, dense bubbles, and grains of sand. It has a hemispherical body with a slightly concave bottom, an outsplayed rim, and a straight-cut edge. It was made in a mould and features relief decoration of two concentric circles separated by rows of short vertical lines. The bottom features a dashed medallion, circular dots, and a rosette with eleven spirally twisted sections in the centre. It is 6.7 cm tall and has a rim of 11 cm in diameter (Fig. 7.15/29; the related analysis will be published in a forthcoming study by J. Jiřík's team).

158 Isings 1957, 147–148.

159 Koch 1987, 185, Abb. 79.

160 Koch 1987, 187–188, no. 13.

161 Fünfschilling 2015, see *Text und Formenkatalog*, 328–329, Abb. 411, AR 59.2.

The bowl from Vinařice belongs to the group of so-called '*Wabenbecher*' ('honeycomb bowls'), made by blowing the glass bulb into a mould with a relief pattern. Most vessels of this type were produced in the Eastern Mediterranean in the late 4th and first half of the 5th century AD.[162] The concentric circles, combined with short vertical lines adorning the Vinařice bowl, also occur on various types of glass vessels.[163] Such bowls on the continent were found mainly in France and Belgium, and occasionally in Germany; however, Vinařice is missing from Koch's list of 24 sites with such finds.[164] The oldest examples date back to the last third of the 4th century AD, the popularity of the type peaked in the second half of the 5th century AD and gradually faded away in the 6th century AD.[165] These bowls, including the example from Vinařice, often feature so-called Christograms with a multi-petal rosette on the base.[166]

The graves from Úherce and Vinařice were assigned to the Vinařice phase.[167] Unlike the bowl from Praha-Bubny, the two bowls found there have concave bases and straight-cut (unworked) rims; only their decoration differs.

Bottles

Nine vessels, bottles of several types, form a distinct group within the presented glass record (Fig. 8). Bottles with a spherical body and a tall, slender neck were discussed in detail in connection with the find of a ribbed bottle from Slatiňany, found behind the head of the deceased, a woman, in Grave H2.[168] The 12.1 cm tall bottle was made of light green glass; it was pre-blown in a patterned mould with 23 ribs. It has a smooth neck, a funnel-shaped mouth, an inward-folded rim, and a distinct base with no use-wear marks (Fig. 8.12/24 – A2). With a distinctly pressed body, it resembles a small bottle from a grave in Xanten.[169] Usually, bottles have spherical bodies, and only rarely ribs; the bottle from the Juliska part of Praha-Podbaba is one of the few exceptions (Fig. 8.7/16). Other finds from Bohemia, including a small bottle from Grave 70 in Praha-Zličín (Fig. 8.17/38), one from the Kozel hillfort (Fig. 8.3/7), a bottle from Blučina (Fig. 8.18/53), and probably another one from Šaratice in Moravia, which has not been preserved (Fig. 1.25), are undecorated. They all belong to the group of bulbous flasks (Isings 101) appearing in the 3rd century and used throughout the 4th century AD.[170]

Small bottles, both decorated and ribbed, were produced and used for a long time. Their origin is generally sought in the Eastern Mediterranean, and the mapping of older and more recent finds has revealed a gradual spread from the Peloponnese through the Balkans to present-day Hungary, southern Slovakia, Lower Austria, Bohemia, and Germany, and also towards Crimea and France. Examples dating from the late 4th to early 5th century AD are found only in present-day Hungary, while they appear in Lower Austria, Germany, and Bohemia in 5th-century AD contexts.[171]

Anastasios Antonaras noted that a significant proportion of the grave finds in a collection of 59 small bottles from Thessaloniki were imperfect products, and that none of their bases showed signs of use, leading him to believe that these cheap goods were produced solely for burial rather than for use as tableware.[172] This seems to hold for the bottles from Slatiňany, Praha-Podbaba, and Blučina.

162 Stern 2001, 31.
163 Stern 2001, 31.
164 Koch 1987, 193–194, Abb. 81.
165 Koch 1987, 192.
166 Koch 1987, 191.
167 Svoboda 1965, 299 nos 57 and 59.
168 Jílek *et al.* 2025, 310–312, 6.9.1 Flask.
169 Wieczorek *et al.* 1996, 27, Abb. 19.
170 Isings 1957, 119–120.
171 Jílek *et al.* 2025, 312, Fig. 13.
172 Antonaras 2017, 99.

Two bottles from Graves 90 and 143 in Praha-Zličín are decorated with arcs made of fine threads. The shape of the first is identical to the undecorated specimens: it has a spherical body with a concave base and a tall, slightly everted neck with a funnel-shaped mouth and an inward-folded rim (Fig. 8.17/43 – A8). Only a part of the unusual, sack-shaped body of the second vessel has been preserved; it smoothly transitions into an open mouth with a straight-cut (unworked) rim. The 'neck' below the rim is adorned with several rows of threads (Fig. 8.17/48 – A9). Both vessels were made of colourless glass and have developed a brown corrosion layer. Analogies to these small bottles have yet to be found; however, identical glass composition suggests that they were made in the same workshop as three beakers from Graves 31, 78, and 94 in the same cemetery (Fig. 2.17/35 – A5 and Fig. 3.17/46 – A7).



Fig. 8. Bottles. 3/7 – hillfort Kozel near Hostim, 7/16 – Praha-Podbaba, 12/24 – Slatiňany, Grave H2 (after Jiřík *et al.* 2015, 297, Fig.7.1), 17/38 – Praha-Zličín, Grave 70 (after Jiřík 2019, Tab. 14.18), 17/43 – Praha-Zličín, Grave 90 (after Jiřík 2019, Tab. 17.12), 17/48 – Praha-Zličín, Grave 143 (after Jiřík 2019, Tab. 28.30), 17/49 – Praha-Zličín, Grave 144 (after Jiřík 2019, Tab. 29.1), 18/53 – Blučina, 25/60 – Šaratice (not found), 28/67 – Všetuly, Grave 508/808 (M. Kroměříž) (drawings by Hedvika Sedláčková, photo by Jaroslav Šafer, technical preparation by Anne-Marie Rohanová and Karolína Pánová).

The bottle from Grave 508/808 in Všetuly, Moravia, has part of its body and neck decorated with 21–22 rows of fine thread (Fig. 8.28/67 – A19). It is made of yellowish glass and is 18 cm tall, with a maximum diameter of 8.1 cm. Proportionately, its neck is much longer than that of ribbed bottles; its rim is inward-folded, and its base is concave without a rim. It is difficult to find analogies to this bottle among coeval glass finds. Spiral thread-winding of vessels, especially small bottles with a shape similar to the one presented, was popular mainly in the 1st century AD, both in the East and in the West. Occasionally, the technique was still used in Western Europe in the late 2nd and 3rd centuries AD, and became popular again throughout the region in the late 4th and 5th centuries AD, when such threads were applied only to the necks of vessels.[173] Examples of older products with the

173 Stern 2001, 29.

entire body wound with thread include a jug made in Gaul or the Rhineland,[174] a beaker probably from Cyprus,[175] and a popular cosmetic bottle of Syrian origin.[176] A close analogy to the bottle from Všetuly, however, remains to be found.

Blučina and Žuráň

So far, the discussion has focused on vessels from row cemeteries, even though some of them contained richly equipped graves. The finds from the Cézavy site near Blučina and Žuráň (Figs 9–10) were obtained from burials of a completely different category, referred to as princely or royal. The glass vessels from both graves have already been discussed in detail.[177] Therefore, they are only briefly mentioned here.

Three glass vessels were placed next to the man's right foot in a grave at Cézavy near Blučina, dated to the second half of the 5th century AD. In addition to the usual spherical bottle (Fig. 8.18/53), the small set included two highly unusual, tall, slightly conical, flute-shaped, bottle-like, bottle-green glass vessels with cut rims. The completely preserved vessel was 34.5 cm tall, with



18/51
A10

18/52
A11

Fig. 9. Blučina. 18/51 – Blučina (after Sedláčková 2016, 106, Abb. 1, right), 18/52 – Blučina (after Sedláčková 2016, 106, Abb. 1, left), (drawings and restoration works by Jitka Seifertová, photo by Lenka Kosová, technical preparation by Karolína Pánová).

174 Stern 2001, 190, Cat. 82.

175 Whitehouse 2001, 145–146, Cat. 658.

176 Whitehouse 2001, 190, Cat. 738.

177 Sedláčková 2016, 105–107.

a base diameter of 3.8 cm and a rim diameter of 1.5 cm. Only the upper part of the second, identical vessel was preserved; it was 28.5 cm long, with a rim of 1.6 cm, and a body at the break of 3.5 cm in diameter (Fig. 9.18/51 – A10, 18/52 – A11).

No identical analogy has so far been found to these vessels. The closest forms—similarly tall, slender and similar in dimensions but cylindrical—can be found among Sassanian glassware from the 3rd to 7th centuries AD; they are believed to have been containers for writing implements,[178] but their use as *balsamaria* cannot be ruled out either.

Chamber II, located in a prehistoric burial mound at Žuráň near Slavkov, was robbed shortly after the funeral in the first half of the 6th century AD. The burial of a woman aged around 38 contained a body fragment and fragments of four vessels: two made of blue glass, one made of yellowish and blue glass, and one made of yellowish glass. A large part of the body was successfully reconstructed from fragments of a blue hemispherical glass bowl made using the '*keramikähnliche Form*' technique, i.e. pressed into a mould together with a ring base. Its shape resembles that of Dragendorff 37 *terra sigillata* bowls. Based on the production technique and shape, it may be dated from the 1st to the 3rd century AD. Subsequently, likely during the 4th century AD, the bowl was decorated with a cut pattern, probably depicting a circus scene including three torso figures and at least two buildings with columns in the foreground. A partial inscription, *HT*, was preserved on the front of one of the buildings. When seen from inside, it reads *TH*, perhaps the beginning of the name Theodosius, the last emperor of the undivided Roman Empire (AD 379–394). Crossed lines are also among the decorative elements used during the 4th century AD. Part of an eight-pointed star, perhaps a Christogram, has also been preserved on the outside of the base. The bowl's life did not end even after it was broken; a repair hole at the edge of the largest fragment attests to the fact that the fragments were probably joined together with gold wire (Fig. 10.29/69–1–5 – A22).[179]

Only two fragments remain from the second blue glass bowl, a conical shape with cut decoration. The largest fragment depicts a multi-storey half-timbered building, possibly a tower, of which the two middle floors have been preserved. A letter *H* appears next to the bottom floor. The smaller fragment with an indeterminate motif bears the letters *V*(?) and *H*.[180] The depiction of the building/tower corresponds in detail to the four-storey building on a cone beaker from Cologne-Wöringen (Fig. 10.29/70).[181]

Eleven fragments with Greek letters and one with a relief strip with diagonal notches have been preserved from the recycled glass vessel. From the original drinking inscription *ΠΙΣ ΖΩΣ ΚΑΛΩΣ* or *ΠΙΣ ΖΗCΗΣ ΚΑΛΩΣ ΑΕΙ*, only the letters: *A* (alpha(?)), *Λ* or *Π* (lambda), pi; *Σ* or *E* (sigma, eta), and, outside the inscription, *Δ* (delta) could be identified, while the letters on the other fragments could not be identified. The fragments probably come from a Straume VIII-type vessel with a single row of large oval medallions on the body and a relief strip below the inscription, considered to be produced by a workshop in the Near East between the second half of the 4th and the first half of the 5th century AD[182] (Fig. 10.29/71–1–4 selected fragments; light green glass: A21a, blue glass: A21b). Given that no body fragments without letters have been preserved, it cannot be ruled out that only attractive and exotic two-coloured objects, which could have been used as decoration in combination with other materials, were placed in the grave.

178 Whitehouse 2005, Cat. 66–67.

179 Sedláčková 2016, 111–112, Abb. 4.

180 Sedláčková 2016, 112–113, Abb. 5.

181 Fremersdorf 1967, 176.

182 Sedláčková 2016, 107–111, Abb. 3.

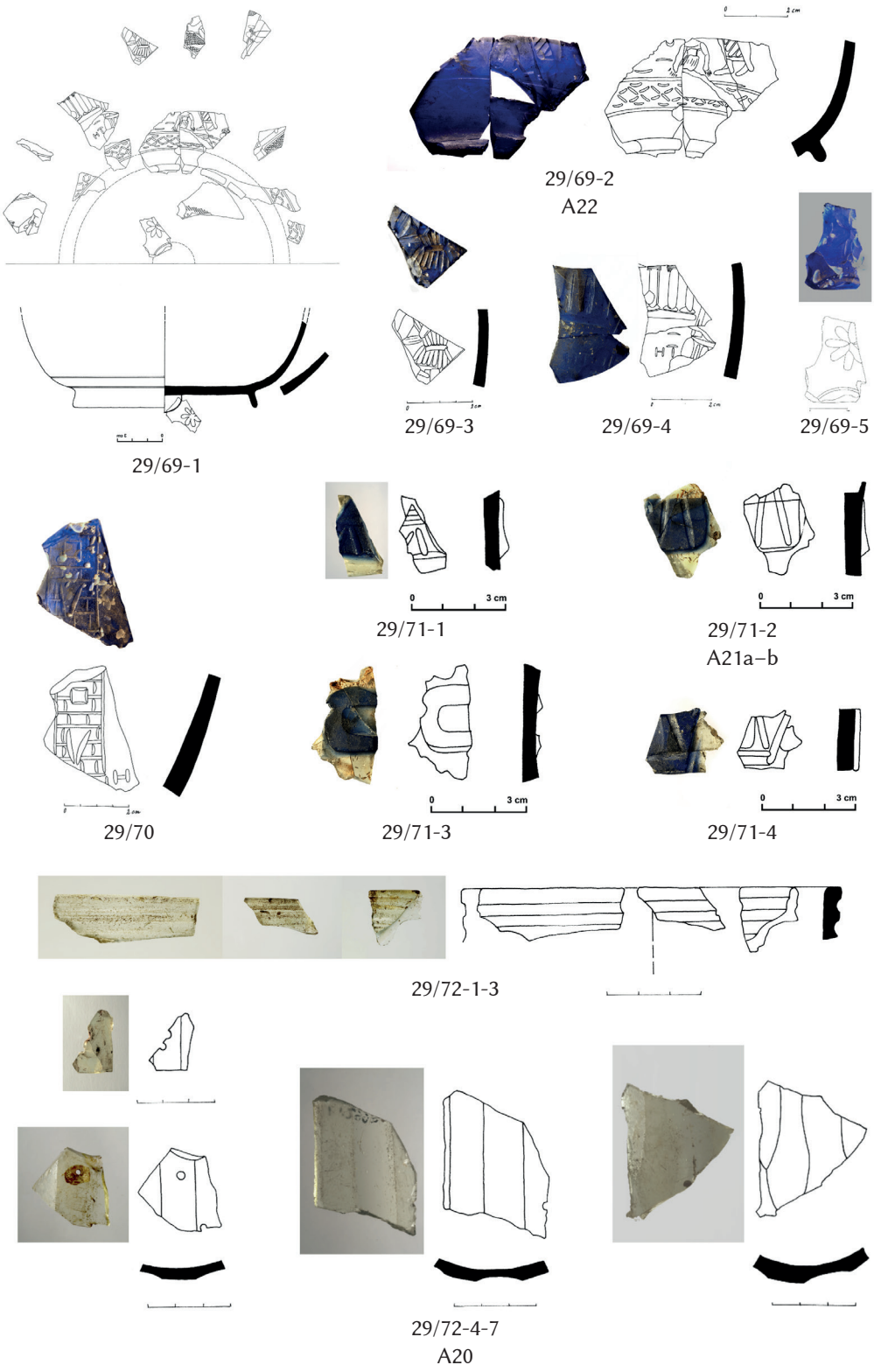


Fig. 10. Žuráň. 29/69 – hemispherical bowl made of blue glass. 1 – reconstruction of the shape, 2 – part of two figures, 3 – part of the figure of a charioteer, 4 – part of building with letter *TH*, 5 – the bottom with an eight-pointed star (after Sedláčková 2016, 110, Abb. 4, assortment), 29/70 – fragment of a conical vessel with a building scene (after Sedláčková 2016, 112, Abb. 5.1), 29/71 – fragment of vessel with Greek inscription. 1 – Alpha(?), 2 – Lambda or Pi(?), 3 – Sigma, 4 – delta (after Sedláčková 2016, 112, Abb. 5.1), 29/72 – fragments of a vessel with facets. 1–3 – fragments of the edge, 4–5 – fragment of vessel with drilled holes, 6–7 – fragment of vessel with facets (after Sedláčková 2016, 108, Abb. 2, assortment) (drawings by Hedvika Sedláčková, technical preparation by Anne-Marie Rohanová and Karolína Pánová).

Nineteen fragments of yellowish glass remain from a Dybeck-type faceted vessel belonging to the Straume Group IV. Based on three fragments, its rim was 12 cm in diameter. Nine of the sixteen body fragments had repair holes drilled in them; six featured one each, and three had two holes each. The fragments cannot be joined together, and none of them comes from the base or bottom of the vessel. Most vessels of this type—fifteen specimens—come from Scandinavia, and two from Germany and Poland, from contexts dated to the end of the 4th to the beginning of the 5th century AD. The vessel from Žuráň is so far the only one known outside this area[183] (Fig. 10.29/72–1–7 – A20, selected fragments).

The vessels from Blučina are notable primarily for their unusual shapes. Based on the green to blue-green colour of their glass and production method, they belong to the category of utility glass.

By contrast, the vessels from Žuráň are luxury goods. They are connected primarily by the difference between their estimated time of production and burial in the grave. In the case of the blue bowl, this difference may be several centuries, and at least one century in the case of the other vessels. Although the grave was disturbed several times, robbed shortly after the funeral and dug up by amateur researchers in the 19th century, it is striking that only a few fragments of the vessels have been preserved. No more than two fragments have survived from the conical vessel with the depiction of a building, and only fragments with letters remain from the two-colour vessel with a Greek inscription, raising the possibility that only these attractive fragments were placed in the grave as antiques, souvenirs, or amulets, rather than whole vessels. The noble lady buried there was probably Silinga, daughter of the Herulian king Rodolf, third wife of the Lombard king Wacho, and the mother of his son, Walthari. The woman died as a result of injuries inflicted by a Merovingian spear called *ango*, used mainly in the first half of the 6th century AD, at a time when the Lombards were settling Moravia. The son disappeared without a trace from history. The manner of burial corresponds to the customs of the East Germanic population or the inhabitants of Scandinavia.[184]

Claw beaker—a surprise at the end

Surprisingly, even a distinctly Frankish type of glassware, the claw beaker, can be found in Central Europe. Fragments of such a beaker were discovered at a burial site in Zohor near Bratislava, Slovakia, at the beginning of the second half of the 20th century; it could be dated roughly to the mid-5th century AD.[185] Several types of these peculiar vessels were widespread in Western Europe from the 5th to the mid-6th century AD. They differed in body shape, the number of spouts, and the extent and placement of additional decoration, mainly spirally wound threads.[186] Specific shape and dating are irrelevant in the case of the find from Držovice because Grave 13/24, dated to the first decades of the 6th century AD, did not contain a whole vessel (either complete or in fragments) but only a single fragment with a carefully worked break from the upper part of a spout. The fragment, measuring 2.47 × 2.25 cm, was made of colourless glass and features groups of small teeth created by pinching with a metal tool (Fig. 11.21/56 – A12); originally, it was covered with a dark grey corrosion layer that could be peeled off. Based on that and its relative position within the grave, it was reused as a clothing accessory, probably applied to the garment somewhere on the left shoulder, likely set in a base made of organic material. Fragments modified to serve purposes other than

183 Sedláčková 2016, 107, Fig. 2.

184 Tejral 2009, 138–139; Sedláčková 2016, 113–114.

185 Adamíková 2020, 29, Cat. 100.

186 See Koch 1987, 165–167, for more details.

the original are not too rare: the possibility also arose with context to some vessel fragments from Žuráň from the first half of the 6th century AD, and a Great Moravian grave in Mikulčice contained a base fragment of an ancient vessel that was definitely modified into a pendant/amulet.[187] One will probably never determine whether the modification occurred locally or whether the already repurposed object was obtained elsewhere. In any case, the modification could have been carried out by a skilled craftsman, i.e. a jeweller equipped with the necessary tools.

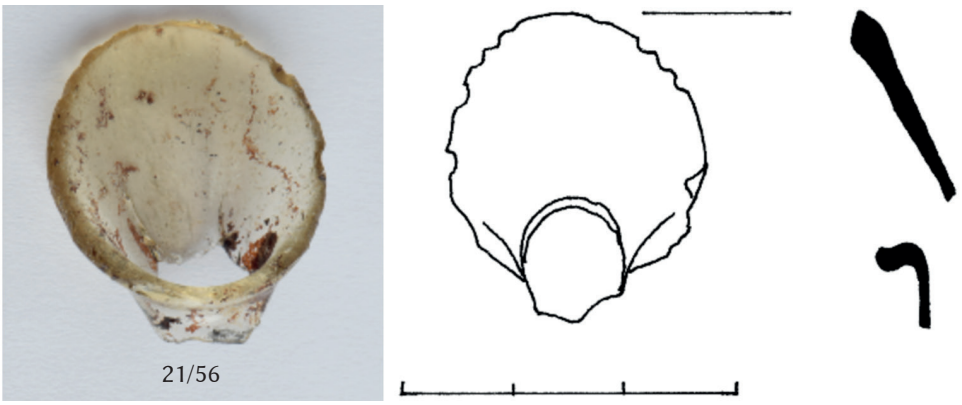


Fig. 11. Claw beaker. 21/56, A12 – Držovice, Grave 13/24 (drawings by Hedvika Sedláčková, photo by Andrea Šindlerová).

Chemical composition and possible origin of glasses

All 26 analysed vessels were made of sodium–calcium glass (Na_2O–CaO–SiO_2), commonly referred to as natron glass. This type of glass was produced in Egypt, the Middle East, and southern Europe (within the Roman Empire) for at least two millennia; its production gradually ceased in the second half of the 9th century AD.[188] The analysed glasses date to the Roman Imperial/Late Antique period (1st–6th century AD), with an overlap into the Early Byzantine period (4th–7th century AD).[189]

The source of silica (SiO_2) was coastal sand, which, in addition to SiO_2, contained calcareous remains of marine shells (calcite/aragonite, $CaCO_3$) and small amounts of feldspar (sodium or potassium feldspar, $KAlSi_3O_8$). Besides SiO_2 and Al_2O_3, feldspar also contains minor alkalis (e.g., K_2O). The natural mineral natron, a mixture of sodium salts (Na_2CO_3, $NaHCO_3$, sodium carbonate hydrates, and also NaCl or Na_2SO_4),[190] was used as a flux. The proportions of individual sodium salts in natron vary considerably depending on the deposit.

Natron glass is characterised by a very low content of K_2O and MgO (both oxides are usually below 1.5 wt%). Phosphorus pentoxide (P_2O_5) occurs in natron glass only as a contaminant (up to about 0.5 wt%) and likely originates from plant material used as fuel.

Owing to the good availability of raw materials, from the 2nd century AD, glass was often melted centrally (primary production) and distributed as ingots for remelting and shaping into final products (secondary production). After the mid-9th century, production of natron glass ceased completely, likely due to political and economic factors.[191] Natron was gradually replaced by ash from

187 Sedláčková – Rohanová 2020, 358–359.

188 Phelps et al. 2016.

189 Gliozzo *et al.* 2017.

190 It was mined in Egypt (Wadi Natrun) and in the Middle East (Haifa). In Egypt, it was used to dry bodies before embalming.

191 Phelps *et al.* 2016.

desert and semi-desert plants, which had a high sodium ion content. Plant ash also supplied calcium, potassium, and magnesium.

Classification of glasses according to chemical composition

The chemical composition of the analysed glasses from grave finds in Bohemia and Moravia (Tab. 1), together with their colouration, indicates that they fall into three groups of natron glass:

- Colourless glasses with low Fe content (up to 0.7 wt% FeO) and decolourising Mn content (up to 0.9 wt% MnO);
- Green glasses with elevated Fe content (0.8–4 wt% FeO) and low (natural) Mn content (0–0.4 wt% MnO) (HI);
- Yellow-green to olive-green glasses, the so-called High Iron–Manganese and Titania (HIMT) glasses, with Fe and Mn intentionally added as colouring agents.
  HIMT glasses can be further subdivided according to Mn and Fe content (after Rosenow and Rehren[192]):
  - a. Weak HIMT: 0.5–1.1 wt% FeO; 0.5–2 wt% MnO; and 0.1–0.2 wt% TiO_2;
  - b. Strong HIMT: 1.5–2.5 wt% FeO; 1–3 wt% MnO; and 0.3–0.8 wt% TiO_2.

Colourless glasses

The bell-shaped and cone beakers (A5 – Fig. 2.17/35, A6 – Fig. 3.17/40, A7 – Fig. 3.17/46) and two bottles (A8 – Fig. 8.17/43, A9 – Fig. 8.17/48) from Praha-Zličín[193] are characterised by a high Na_2O content (22.3–23.7 wt%) (Figs 12–14, orange points). The FeO content ranges from 0.3 to 0.5 wt% and the MnO content from 0.7 to 0.9 wt%, indicating that the glass was intentionally decolourised with mineral pyrolusite (MnO_2). High Na_2O content is not entirely common in Roman glasses, but similar compositions have been documented,[194] for example, in the Karanis area (Group V, 89, Sample 309), in the Cosa area (V.F, 95, Sample 5271), and the closest compositions are those of group V.X: Carthage, 130, Samples 5284, 5288, 131, and 5292.

During this period, Levantine I-type glasses were produced in the Roman Empire. The colourless (almost yellowish) cup with blue trails of the Snartemo type from Vrchoslavice (A13 – Fig. 4.27/63) also belongs to this type (see Figs 12–14, green point). Given the almost identical chemical composition of the colourless vessels, they were certainly produced at the same workshop.

Glasses with high Fe content and low or absent Mn content (HI)

The yellowish vessels from Všetuly, which have high Fe content (1.9–4 wt% FeO) and, conversely, low to absent Mn content (0–0.4 wt% MnO), are shown in Fig. 14 (brown points). The composition of both Snartemo-type beakers (A16 – Fig. 4.28/65, A17 – Fig. 4.28/66) and the bottle from Všetuly (A19 – Fig. 8.28/67) are highly similar. The Snartemo-type beaker and the bottle have lower CaO contents (4.4 and 3.1 wt%, respectively), and the SiO_2 content logically decreases with increasing FeO content: the higher the FeO content of the glass, the lower the SiO_2 content. These glasses were made in Egypt or the Near East, as their composition matches that of Egypt I-type glasses. All glasses contain a relatively high amount of Al_2O_3 (3–4.1 wt%), perhaps due to the addition of iron-rich raw materials.

192 Rosenow – Rehren 2014.

193 Jiřík *et al.* 2015, 200.

194 Brill 1999.

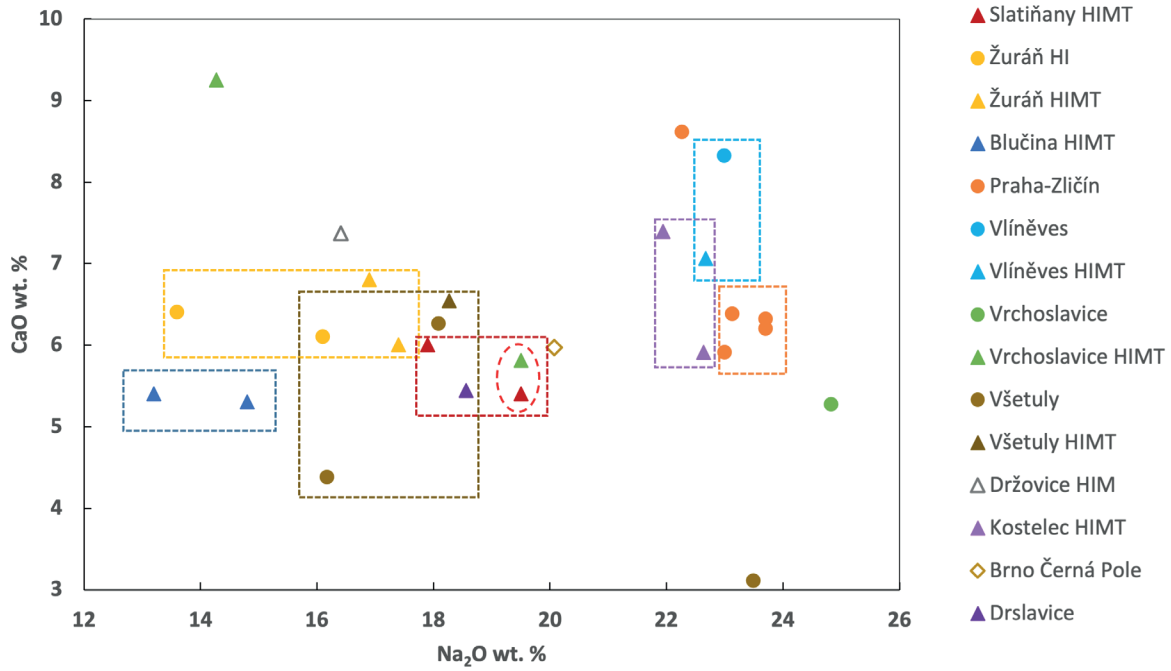


Fig 12. Na_2O concentration in the glasses ranges relatively widely, from 13 to 25 wt%, while the CaO content is usually between 5 and 8 wt%. Since CaO is assumed to originate from the sand, its amount shows no linear correlation to the Na_2O content. The glasses from Praha-Zličín and Vlíněves have the highest Na_2O levels, and the tall flute-shaped bottles from Blučina have the lowest.

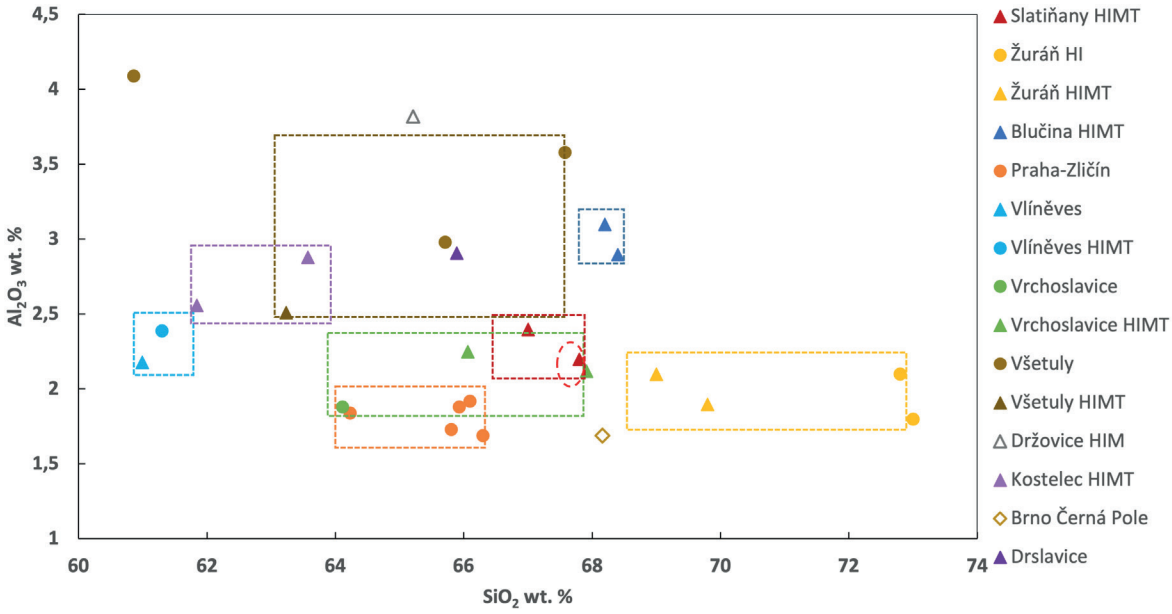


Fig. 13. Sand-derived oxides clearly demonstrate the different origins of the glasses and, thus, the sand deposits. Glasses from Žuráň have the highest SiO_2 content, which in most samples ranges from 63 to 69 wt%.

The deep blue glass fragment from Žuráň (A22 – Fig. 10.29/69) contains only Fe, and copper (0.2 wt% CuO) was added for colouring (Figs 12–14, yellow points), similar to the blue lettering on the light green fragment (A21b – Fig. 10.29/71). The analyses of both blue glasses found at Žuráň are very similar, suggesting a single production workshop. However, it is clear from Fig.13 that the glass from Žuráň belongs to a different production area than Všetuly, because it has a much lower Al_2O_3

content (1.8 wt%). Glass with a higher Fe content and without added Mn was also found in Bulgaria (Dichin),[195] and the authors referred to it as High Iron and Titania (HIT). However, our glasses do not have such a high TiO_2 content (up to around 0.7 wt%).

HIMT glasses

Based on their chemical composition (Tab. 1) and a comparison with published data,[196] some of the analysed glasses belong to the so-called High Iron–Manganese and Titania (HIMT) natron glasses.[197] HIMT-type glasses are characterised by high FeO and MnO contents and relatively high TiO_2 content. Iron and manganese were intentionally added to the glass as colouring agents. Two different materials may have been used as colourants, as they do not have a uniform ratio within the glass.[198] Titanium (Ti) and aluminium (Al) in the glass are impurities originating from the raw material and the colouring agents.

Mirti and her colleagues[199] divide HIMT glasses into two subgroups, HIMT1 and HIMT2, while Ceglia et al.[200] and Freestone et al.[201] use the designations HIMTa and HIMTb. Conversely, Rosenow and Rehren[202] classified the glasses from the Tell Basta/Bubastis site, located at the eastern mouth of the Nile Delta, as Weak HIMT and Strong HIMT. HIMT-type natron glasses were produced in the same period as Levantine I and II glasses, from the 4th to the 7th century AD. Levantine glasses have a lower Na_2O content (14–15 wt%), whereas most HIMT glasses in our analyses (except for the bottles from Blučina) are characterised by a relatively high Na_2O content (17–23 wt%), similar to Egyptian HIMT.

Indicators of decolourisation and provenance

In the 4th–7th centuries AD, glass decolourisation using manganese (Mn) prevailed; this technology was associated with the Levantine coast. Antimony (Sb) as a decolourising agent was not detected in the analysed glasses from Bohemia and Moravia. Glasses from the Egyptian Delta typically contain about 6 wt% CaO and 1.1–3.2 wt% Al_2O_3, indicating the use of less pure sand.[203]

Foster and Jackson[204] dated the production of those HIMT1 glasses to the mid-4th century AD. They note that these glasses were used for making conical vessels, and their composition matches, for example, Romano-British (Anglo-Saxon Period I) finds from the mid-4th to early 5th century AD.[205] Other authors[206] assume an Egyptian origin, but Foster and Jackson[207] place their origin to the Eastern Mediterranean coast (the Levant, i.e present-day Israel, Palestine, and Syria). This area

195 Rehren – Cholakova 2010, 85, Tab. 1, Samples G01–G03.

196 Foster – Jackson 2009, 192, Tab. 4.

197 Rehren – Freestone 2014; Ceglia *et al.* 2015; Freestone *et al.* 2018.

198 Sedláčková *et al.* 2014. In northern Italy, brown to purple glass was produced in the 12th–13th centuries AD. It was coloured with natural raw materials such as umber, in which the MnO/Fe_2O_3 ratio is stable around 1:3).

199 Mirti *et al.* 1993.

200 Ceglia *et al.* 2015.

201 Freestone *et al.* 2018.

202 Rosenow – Rehren 2014.

203 Gliozzo 2017.

204 Foster – Jackson 2009, Appendix B.

205 Freestone *et al.* 2008.

206 Freestone *et al.* 2005; Foy *et al.* 2003; Freestone *et al.* 2018.

207 Foster – Jackson 2009, Appendix B.

experienced significant development in the 4th century AD, and its products (wine and olive oil) were exported throughout the Roman Empire.

Wedepohl et al.[208] argued for a Western European origin and suggested production in the Hambach Forest (Germany). This hypothesis was later refuted by Rehren et al.,[209] who analysed samples using ICP-MS and concluded that the glasses' composition is very similar to that of HIMT glasses found throughout the Roman Empire. Conclusively, the workshop at Hambach likely relied on secondary production (remelting of imported glass ingots). Moreover, similar glasses are documented across a wide part of the Roman Empire, from northern Britain through France, Italy, North Africa, and the Balkans, where glass with such a chemical composition predominates around the mid-4th century AD, corresponding precisely to the time of operation of the glass furnaces in the Hambach Forest.

A comparison of vessels of the same type might also bring interesting results. For example, the conical Kempston-type beaker from England (Spong Hill site) was made of HIMT1 glass,[210] but the conical Snartemo-type vessel, found in Helgö, Sweden was made of another type of natron glass with a relatively high Al_2O_3 content and containing K_2O, i.e., from coastal sand with a high proportion of feldspar.[211] The composition of these vessels does not correspond to the analysed finds from Bohemia and Moravia.

In evaluating the present findings, we rely on the study by Rosenow and Rehren,[212] who published data on glasses from the Bubastis (Tell Basta) site. The chemical composition of HIMT-type glasses from Bohemia and Moravia is similar to that of these finds. Obviously, not all artefacts found in Moravia and Bohemia were produced and processed in the eastern Mediterranean coastal area, but one must reckon with secondary processing of ingots in Western Europe.

Weak HIMT subgroup

Specimens with 0.5–1.1 wt% FeO, 0.5–2 wt% MnO, and 0.1–0.2 wt% TiO_2 content were included in this subgroup of natron glasses. Some finds from Bohemia belong to the weak HIMT subgroup: for example, a Kempston-type beaker (Fig. 4.1/1) and a light green bowl (Fig. 7.1/2) from Čertova Ruka, Semily District.[213] Based on its 0.2 wt% TiO_2 content, the greenish-yellow lamp (A1 – Fig. 5.12/23) found in Grave H3 in Slatiňany, eastern Bohemia, may also be classified here. The light-green goblet from Brno-Černá Pole (A23 – Fig. 6.19/54) can also be assigned to this group (Figs 12–14, open beige diamond). In a previous publication,[214] it was included in Foster and Jackson's HIMT1 group.[215]

Vessels from Vlíněves, a cone beaker (A3 – Fig. 3.16/31) and a lamp (A4 – Fig. 5.16/30), also belong here.[216] They have elevated Na_2O content, surprisingly low SiO_2 content (around 60 wt%), and contain P_2O_5 (a contaminant from plant-based fuel), as well as a small amount of SnO_2. The material of the beaker contained 0.1 wt% CuO, added to achieve the desired dark olive-green shade.

Among the Moravian finds, a colourless lamp from Vrchoslavice (A15 – Fig. 5.27/62), two fragmentary finds from Žuráň (a faceted fragment, A20 – Fig. 10.29/72, and a fragment with letters, A21a –

208 Wedepohl *et al.* 2001, 1.

209 Rehren – Brüggler 2020.

210 Hunter – Sanderson 1982, Tab. 3.A12460.

211 Hunter – Sanderson 1982, Tab. 3.A2526.

212 Rosenow – Rehren 2014.

213 The study will be published later by Jaroslav Jiřík and his colleagues.

214 Jílek *et al.* 2025.

215 Foster – Jackson 2009.

216 Berkovec 2006, 375–376, Table of chemical analyses (provided by V. Hulínský).

Fig. 10.29/71)[217] were made of weak HIMT glass. Moreover, two vessels from graves dated to the late 4th century AD at Kostelec na Hané were analysed for comparison (A25 and A26).[218]

Strong HIMT subgroup

This subgroup includes glasses that meet the oxide-content criteria of 1.5–2.5 wt% FeO, 1–3 wt% MnO, and 0.3–0.8 wt% TiO_2.

The finds from Vinařice, including a semi-ovoid cup (Fig. 2.15/28) and a bowl with relief decoration (Fig. 7.15/29) are typical representatives of strong HIMT glass in Bohemia.[219] A green bottle from Slatiňany (A2 – Fig. 8.12/24) and a cone beaker from Drslavice (A24 – Fig. 2.20/55) were also assigned to this group. Although its FeO and MnO contents of the latter fall within the ranges of both weak and strong HIMT (see Fig. 14), the higher TiO_2 content (0.4 wt%) places it in the strong HIMT group.

In Moravia, two tall flute flasks/bottles were discovered in Blučina at the right foot of a man buried in a princely grave (A10 – Fig. 9.18/51, A11 – Fig. 9.18/52). Both bottles, exceptional in shape, were made of dark green and blue-green glass.[220] Their sodium oxide content is the lowest among the analysed samples (around 14 wt% Na_2O), similar to Levantine-type glass. The MnO and FeO levels are relatively high (2.4 and 3.4 wt% MnO, and 3.2 and 3.5 wt% FeO, respectively). The bulbous flask from the same grave was not analysed.

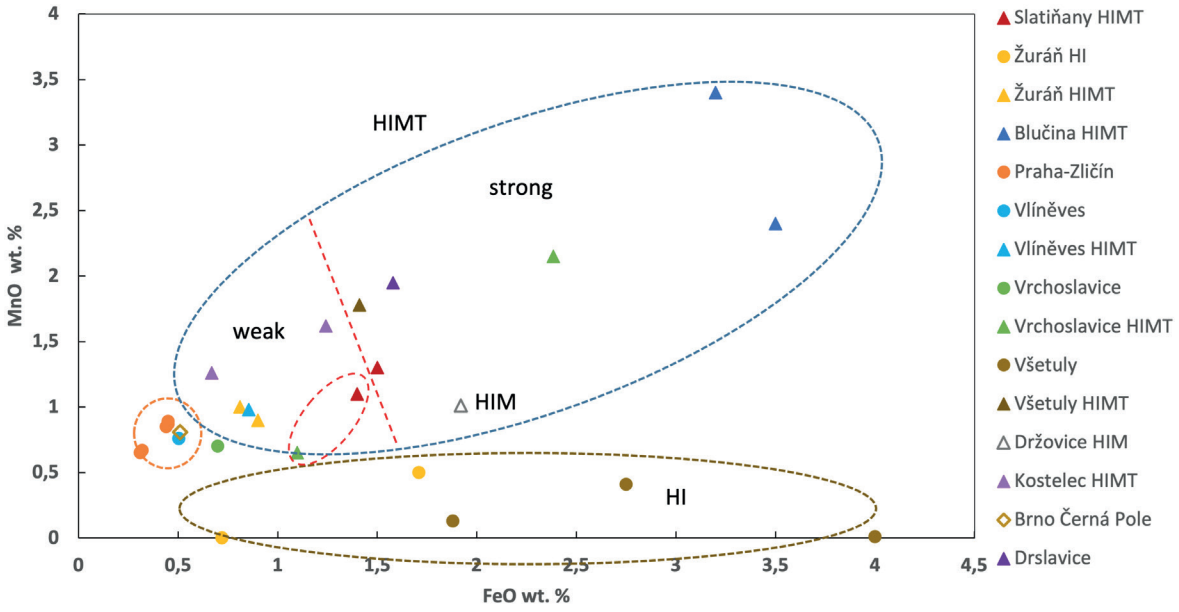


Fig. 14. The analysed samples clearly cluster in three distinct groups. HIMT glasses are further subdivided into strong and weak subgroups. Orange dots in the bottom left represent colourless glass vessels from Praha-Zličín; dark green dot marks one from Vrchoslavice; light blue dot marks one from Vlíněves. Brown dots to the right mark a group of glasses with high Fe content and no Mn from Všetuly (HI). This group also includes two samples from Žuráň (yellow dots).

217 Sedláčková 2016, 114, Table of chemical analyses (provided by Z. Cílová, 2011).

218 The study will be published later by Jaroslav Jiřík and his colleagues.

219 The study will be published later by Jaroslav Jiřík and his colleagues.

220 Observers may perceive the colour of the vessels differently as it depends on lighting, glass thickness, and angle of view. A similar phenomenon was observed while studying Gothic glass from the 14th–15th centuries AD. This is not dichromism but rather selective light absorption caused by polyvalent Fe and Mn ions. A comparable effect was observed in the analysis of medieval glass finds from Wenceslas Square in Prague. This phenomenon will be discussed in more detail in a separate, forthcoming publication.

Tab. 1. Chemical analyses of natron glasses, Migration Period, 4th–5th centuries AD [wt.%].

Analysis	Locality	Inv. no.	Vessel type	Fig. no.	SiO_2	Al_2O_3	CaO	K_2O	Na_2O	MgO	MnO	FeO	TiO_2	P_2O_5	SnO_2	CuO	SO_3	Cl	Glass type/ colour	Method	Notice
A1	Slatiňany[1]	H3-A1	Lamp	Fig. 5.12/23	67	2.4	5.4	0.5	19.8	0.9	1.1	1.4	0.2	n.d.	n.d.	n.d.	0.5	0.7	w HIMT	SEM/EDS	
A2		H2-A2	Bottle	Fig. 8.12/24	67.8	2.2	6	0.6	17.9	0.9	1.3	1.5	0.4	n.d.	n.d.	n.d.	0.4	0.7	s HIMT	SEM/EDS	
A3	Vliněves[2]	H 195	Cone beaker	Fig. 3.16/31	61.3	2.39	7.06	0.4	22.67	0.69	0.98	0.95*	0.4	0.21	0.34	0.09	0.28	1.25	w HIMT	SEM/EDS	
A4		H 188	Lamp	Fig. 5.16/30	60.99	2.18	8.32	0.35	22.99	0.55	0.76	0.56*	0.35	0.14	0.25	n.d.	0.19	1.4	w HIMT	SEM/EDS	
A5	Praha-Zličín[3]	541/31	Bell-shaped	Fig. 2.17/35	65.81	1.73	6.32	0.31	23.7	0.68	0.65	0.31	0.07	n.d.	n.d.	n.d.	n.d.	n.d.	colorless	microXRF	
A6		547/37	Cone beaker	Fig. 3.17/40	64.23	1.84	8.61	0.32	22.27	0.87	0.85	0.44	0.09	n.d.	n.d.	n.d.	n.d.	n.d.	colorless	microXRF	
A7		780/94	Cone beaker	Fig. 3.17/46	66.3	1.69	6.38	0.29	23.13	0.71	0.67	0.32	0.07	n.d.	n.d.	n.d.	n.d.	n.d.	colorless	microXRF	
A8		729/90	Bottle	Fig. 8.17/43	65.93	1.88	6.2	0.32	23.7	0.95	0.87	0.45	0.09	n.d.	n.d.	n.d.	n.d.	n.d.	colorless	microXRF	
A9		1556/143	Bottle	Fig. 8.17/48	66.1	1.92	5.91	0.31	23	0.91	0.89	0.45	0.09	n.d.	n.d.	n.d.	n.d.	n.d.	colorless	microXRF	
A10	Blučina[4]	157/560	Bottle	Fig. 9.18/51	68.2	3.1	5.4	0.8	13.2	1.2	3.4	3.2*	0.8	n.d.	n.d.	n.d.	n.d.	0.8	s HIMT	SEM/EDS	
A11		157/561	Bottle	Fig. 9.18/52	68.4	2.9	5.3	0.7	14.8	0.8	2.4	3.5*	0.3	n.d.	n.d.	n.d.	n.d.	0.9	s HIMT	SEM/EDS	
A12	Držovice[5]	343.701	Claw beaker	Fig. 11.21/56	65.21	3.82	7.37	0.75	16.41	1.37	1.01	1.92	0.02	0.26	n.d.	n.d.	0.91	0.92	HIM	SEM/EDS	
A13	Vrchoslavice[6]	H7-446	Snartemo	Fig. 4.27/63	64.11	1.88	5.27	0.33	24.83	0.23	0.7	0.7*	0.05	n.d.	n.d.	n.d.	n.d.	1.22	colorless	SEM/EDS	
A14		H9-447	Snartemo	Fig. 4.27/64	66.06	2.25	9.25	0.5	14.27	0.93	2.15	2.65*	0.45	n.d.	n.d.	0.5	n.d.	1.1	s HIMT	SEM/EDS	
A15		H6-452	Lamp	Fig. 5.27/62	67.91	2.12	5.81	0.39	19.5	0.54	0.65	1.22*	0.22	0.1	n.d.	n.d.	0.2	0.92	w HIMT	SEM/EDS	
A16	Všetuly[7]	500/800	Snartemo	Fig. 4.28/65	67.58	3.58	4.38	0.54	16.17	1.54	0.41	2.75	0.02	0.45	n.d.	n.d.	1.4	1.16	HI	SEM/EDS	
A17		507/807	Snartemo	Fig. 4.28/66	65.71	2.98	6.26	0.7	18.09	1.59	0.13	1.88	0.22	0.28	n.d.	n.d.	0.97	1.17	HI	SEM/EDS	
A18		510/810	Goblet	Fig. 6.28/68	63.23	2.51	6.54	0.66	18.27	1.02	1.78	1.41	0.2	0.29	n.d.	n.d.	1.07	1.42	s HIMT	SEM/EDS	1.57 NiO
A19		508/808	Bottle	Fig. 8.28/67	60.86	4.09	3.11	0.05	23.49	1.96	0.01	4	0.02	0.48	n.d.	n.d.	1.09	0.82	HI	SEM/EDS	
A20	Žuráň[8]	812/3-51/54	with facets	Fig. 10.29/72	69.75	1.88	6.01	0.47	17.38	0.88	0.92	0.96*	0.4	n.d.	n.d.	n.d.	n.d.	1.4	w HIMT	SEM/EDS	
A21a		812/3-60/54	Vessel green	Fig. 10.29/71	69	2.13	6.75	0.65	16.89	0.95	0.99	0.9*	0.28	n.d.	n.d.	n.d.	n.d.	1.5	w HIMT	SEM/EDS	
A21b			Blue letter	Fig. 10.29/71	72.78	2.13	6.35	0.78	13.59	1.05	0.45	1.9*	0.1	n.d.	n.d.	0.12	n.d.	0.87	HI blue/ Cu	SEM/EDS	
A22		812/3-58/54	Blue Bowl	Fig. 10.29/69	73.04	1.75	6.07	0.57	16.11	0.37	0.05	0.81*	0.09	n.d.	n.d.	0.21	n.d.	1	blue/ Cu	SEM/EDS	
A23	Brno-Černá Pole	107 296	Goblet	Fig. 6.19/54	68.16	1.69	5.97	0.45	20.07	0.6	0.8	0.5	0.18	n.d.	n.d.	n.d.	0.4	0.7	w HIMT	SEM/EDS	
A24	Drslavice	68 417	Beaker	Fig. 2.20/55	65.89	2.91	5.44	0.5	18.56	1.27	1.95	1.58	0.59	n.d.	n.d.	n.d.	0.33	0.61	s HIMT	SEM/EDS	
A25	Kostelec na Hané[9]	grave 135	Vessel	none	63.57	2.88	5.91	0.43	22.64	0.85	1.26	0.74*	0.14	0.04	n.d.	n.d.	0.22	1.21	w HIMT	XRF	
A26		grave 250	Vessel	none	61.87	2.56	7.39	0.6	21.94	0.81	1.62	1.38*	0.14	0.08	n.d.	0.05	0.31	1.07	w HIMT	XRF	

* Fe_2O_3; n.d. not detected; [1] Jílek et al. 2025, 318, Tab.1; [2] Limburský et al. 2010, 111–168, Tab. 9; [3] Jiřík et al. 2015, 200, Table, data provided by S. Greiff; [4] Seifertová 2012; [5] see Note 60; [6] Berkovec 2006, 375–376, Tab, analyses provided by V. Hulínský; [7] see Note 60; [8] Sedláčková 2016, 114, Tab.1, analyses provided by Z. Cílová; [9] To be published.

A Snartemo-type beaker from Vrchoslavice (A14 – Fig. 4.27/64) also belongs to the strong HIMT group, just as the goblet from Všetuly (A18 – Fig. 6.28/68). The body of this goblet has a light purple hue, which is unusual in the period. The colour results from high MnO content (1.78 wt%) and the oxidation–reduction conditions during melting. In this case, the melt was exposed to an oxygen-rich atmosphere, leading to the purple form of manganese (Mn^{3+}) prevailing. The blue rim of the goblet and its solid base were probably coloured with cobalt (Co). The claw beaker fragment from Držovice (A12 – Fig. 11.21/56) could also be included in this group, with some reservations. However, it contains almost no TiO_2 (only 0.02 wt.%). The sample was designated HIM.

Conclusions

This study presents a comprehensive analysis of 72 vessels from Bohemia and Moravia, focusing solely on shape, technical and manufacturing characteristics, and supplemented by a material composition analysis of 26 samples. The intent was not to provide an overview or information on all aspects related to these predominantly grave finds; therefore, it does not include descriptions of the grave pits, burial rites and anomalies, grave goods, and their dating. Hopefully, the presented results provide a basis for future work, raise ideas and questions to be addressed by younger generations of researchers.

Several aspects of the vessels were studied. In addition to typological classification, technical and manufacturing traces were assessed. The shaping of the rim is an important chronological marker: many analysed vessels have a bowl-shaped mouth and an outsplayed, unworked rim, more common in the late Roman period.[221] All semi-ovoid bowls have such rims, as do the lamp and *Wabenbecher* from Vinařice, and the bottle with arc decoration from Grave 143 in Praha-Zličín. The tall bottle-shaped vessels from Blučina also feature unworked rims, while bulbous flasks have everted rims. The sharp stub of the imperfectly broken upper part of a bulb was observed on the rim of a lamp from Vinařice. Other beakers and a bottle with ribs from Grave 144 in Praha-Zličín have thickened, sealed, or everted rims.

Marks of pipe blowing were found on a cone beaker from Kolín, a bottle and a lamp from Slatiňany, a Kempston-type beaker from Praha-Kobylisy, and the bases of a lamp from Vrchoslavice and a bottle from Praha-Podbaba, respectively. The body above the widest part of the belly of the latter is pinched, indicating that the vessel was held with tweezers during further work.

Some graves were clearly furnished with unused vessels, the bases of which bear no signs of prolonged use. The bottles from Slatiňany, Praha-Podbaba, and Blučina, and both Snartemo-type beakers and goblets from Moravia, have certainly never been used, but that could not be proven in other cases.

Most vessels, including various types of beakers, have no separate bases and were shaped from a single piece of glass. Such are the Snartemo-type beakers from Tišice and the goblet from Brno-Černá Pole, which incorporate a rare and complex technical solution in the form of a folded foot or folded stemmed foot, giving the impression of having been made from two parts. Although this production method, known primarily from goblets, is believed to have originated in the Eastern Mediterranean in the 5th century AD, it was clearly also applied to other forms in Europe. However, the exact manufacturing process of the goblet from Všetuly remains unclear; the bowl from Vinařice was clearly made using a relief mould.

Other Snartemo-type beakers have an attached base, i.e. were made of two parts. Complete examples from Vrchoslavice and Všetuly show that they were created by attaching a twisted thick thread

221 Lazar 2003, 19–20, Fig. 6.6, 'curved rim'.

to the base and then pressing and smoothing it to form a base. This indicates that even identical forms—especially Snartemo-type beakers—may have been produced using different techniques, probably in different workshops or production circles. The specimen from Tišice and, probably, the single-colour vessel from the Kozel hillfort are likely imports from Scandinavia (?) or Western Europe (?), while slightly different variants may also have been produced in the study area.

The important issue of Snartemo deserves a separate, detailed study. The discovery of the 'treasure' of seven vessels at the Kozel hillfort was significant for improving understanding of the glass trade in the 5th century AD. Although a detailed evaluation of the find is still in preparation, it can already be said that the merchant transporting these items to Bohemia carried diverse types of vessels—whether the products of a single workshop will only be revealed by analysis of their composition. However, a unique Snartemo-type beaker with blue threads in this 'treasure' and another at a distant site in Moravia may expand the known distribution area of this rare commodity. The location of the find near the south-western border of today's Czech Republic (Fig. 1.3) indicates a route to Micro-regions 9 and 10, Alamannia and Bavaria.[222]

The provenance of lamps/beakers with pointed or rounded bases raises interesting questions. The shape, which clearly originated in the Eastern Mediterranean, was adopted into the Western European repertoire, as evidenced by finds from the only glass workshop examined so far in Macquenoise, Belgium. Although represented only by a few dozen examples, such lamps/beakers were most common in the area of present-day France and the adjacent part of Belgium, followed by Bohemia; the reasons behind this distribution remain to be revealed.

Based on provenance, the vessels are connected to several main areas: Kempston-type beakers are undoubtedly from Western Europe, and most probably also Snartemo-type beakers and two bowls (an indented bowl and a lost bowl with white arcs) originate in Western Europe. Moreover, the secondarily modified claw beaker fragment from Držovice certainly originates there.

Both goblets, a bowl with relief decoration, and, probably, a hemispherical bowl with blue prunts are highly likely to have arrived from the Eastern Mediterranean. However, it cannot be ruled out that some of them were made in a European glass workshop from glass ingots imported from the Eastern Mediterranean or from Egypt.

All analysed samples proved to be natron glass, meaning that the glass batch consisted only of two weight parts sand (containing calcium residues from marine molluscs) and one part mineral natron. The production of coloured glass became widespread in the Eastern Mediterranean and the Nile Delta between the 4th and 7th centuries AD. Due to their high Mn, Fe and Ti contents, these glasses are referred to as High Iron, Manganese and Titanium (HIMT).

The colouring agents added in high quantities coloured the glass from yellow to olive green. A comparison of the graphical representation of the chemical composition in Figs 12–14 shows that

- each site contained glass from a single source;
- the analysed products were made of natron (sodium-calcium) glass, including colourless glass from Praha-Zličín, glass with a high Fe content and no Mn (HI), and glass with high Fe, Mn and Ti contents (HIMT);
- HIMT glass can be further divided into weak HIMT and strong HIMT glass (see Fig. 14);
- Bottle 1556/143 from Praha-Zličín (Fig. 8.17/49 – A9) and the Snartemo beaker (Fig. 4.27/63 – A13) from Vrchoslavice are very similar in chemical composition.

As this valuable material clearly holds potential for further research, the authors particularly appreciate additional information on analogies to lesser-known or previously unknown vessel forms.

222 Jílek *et al.* 2025, 316, Fig. 15.

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