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The Preslav Treasure: Preliminary Report on the Restoration Conducted at the Leibniz-Zentrum für Archäologie (LEIZA), Mainz

In 2017, an international research project was conducted at the Leibniz-Zentrum für Archäologie (LEIZA), Mainz, with the title »The Preslav Treasure from Bulgaria (Tenth Century)«. This interdisciplinary project was a collaboration of the LEIZA with the National Archaeological Institute with Museum in Sofia, Bulgaria (NAIM, Bulgarian Academy of Sciences), and the Archaeological Museum Veliki Preslav (AMVP). The research project was generously funded by the Gerda Henkel Foundation, Düsseldorf, and also received support from the »Freundeskreis des Leibniz-Zentrums für Archäologie (LEIZA) e. V.«.

This paper presents a preliminary report on the restoration of this important medieval jewellery treasure, the investigation into its manufacturing techniques and the photographic documentation, conducted in the laboratories for metalwork[1]. A total of 202 precious metal objects, some with enamels and precious stones, plus a single rock crystal bead, 170 pearls, 4 glass beads and cabochons from the treasure were sent from the Museum Veliki Preslav, Bulgaria, to the LEIZA in Mainz in two batches between January 2017 and April 2018 (**fig. 1**). One enamel fragment of an earring remained in Preslav[2], as well as five enamelled *Senkschmelz*

Fig. 1 The Preslav Treasure in the LEIZA. – (Photo S. Steidl, LEIZA).

1 For an overview on the scientific analysis and the employed methods, see the contribution by M. Aubin, S. Greiff and R. Schwab in this volume.

2 Museum Veliki Preslav, inv. no. 3381/2800-1; see Bosselmann-Ruickbie, Byzantinischer Schmuck 246-248 no. 64. 248 fig. 4.

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Fig. 2 Pendant with emeralds and pearls. – (Photo S. Steidl, LEIZA). – Scale 1:1.

Fig. 3 Pendant with emeralds, counterpart to the pendant in **fig. 2** (pearls now missing). – (Photo S. Steidl, LEIZA). – Scale 1:1.

Fig. 4 Pendant with rubies, emeralds, garnets and pearls. – (Photo S. Steidl, LEIZA). – Scale 1:1.

plaques, believed to have originally formed a diadem, which were subject to separate analyses conducted in Sofia[3].

The first batch[4] comprised three pendants with emeralds, rubies and pearls[5] (**figs 2-4**), a pair of earrings with beaded wire and pearls[6] (**figs 5-6**), a finger ring with a carnelian gemstone[7] (**fig. 7**), a pair of earrings with emerald, rubies, garnets and pearls[8] (**figs 8-9**), 23 gold pendants with filigree and granulation[9] (**figs 10-11**), 82 golden appliques[10] and 15 Byzantine silver coins[11]. The second batch of the treasure[12] contained the large necklace with 28 enamelled plaques[13] (**fig. 12**), an enamelled earring with a peacock[14] (**fig. 13; cover illustration**), two enamelled spherical pendants[15] (**fig. 14**), a rock crystal seal set in gold[16], two silver spoons[17] (**fig. 15**), 29 appliques for textiles[18] (**fig. 16**) and a gilded silver plaque with confronted peacocks[19] (**fig. 20**).

Fig. 7 Finger ring with carnelian gemstone. – (Photo S. Steidl, LEIZA). – Scale 2:1.

3 The material analyses have been carried out by V. Inkova, Sofia (publication of the findings is in preparation). For images of the diadem plaques, see the contribution by Inkova in this volume, **figs 1-5**.
4 Batch 1 of 144 objects arrived on 31 January 2017 and returned to Bulgaria on 26 September 2017.
5 Museum Veliki Preslav, inv. nos 3381/3a, 3381/3b and 3381/4.
6 Museum Veliki Preslav, inv. nos 3381/5.1 and 3381/5.2.
7 Museum Veliki Preslav, inv. no. 3381/15.
8 Museum Veliki Preslav, inv. nos 3381/7.1 and 3381/7.2.
9 Museum Veliki Preslav, inv. nos 3381/18, 3381/19, 3381/20, 3381/23, 3381/24, 3381/25, 3381/26, 3381/27.
10 Museum Veliki Preslav, inv. nos 3381/21, 3381/28, 3381/29, 3381/31.
11 Museum Veliki Preslav, inv. no. 3381/35.
12 Batch 2 of 63 objects in total was in the RGZM from 26 September 2017 until 20 April 2018.
13 Museum Veliki Preslav, inv. no. 3381/1.
14 Museum Veliki Preslav, inv. no. 3381/8.
15 Museum Veliki Preslav, inv. no. 3381/16.
16 Museum Veliki Preslav, inv. no. 3381/36.
17 Museum Veliki Preslav, inv. nos 3381/51, 3381/52.
18 Museum Veliki Preslav, inv. nos 3381/30, 3381/32, 3381/33, 3381/34.
19 Museum Veliki Preslav, inv. no. 3381/13.

Fig. 5 Earring with beaded wire and pearls. – (Photo S. Steidl, LEIZA). – Scale 1:1.

Fig. 6 Earring with beaded wire and pearls, counterpart to the earring in **fig. 5** (central ornament missing). – (Photo S. Steidl, LEIZA). – Scale 1:1.

Fig. 8 Earring with emeralds, rubies, garnets and pearls. – (Photo S. Steidl, LEIZA). – Scale 1:1.

Fig. 9 Earring with emeralds, rubies, garnets and pearls, counterpart to the earring in **fig. 8**. – (Photo S. Steidl, LEIZA). – Scale 1:1.

Fig. 10 Two pendants with filigree and pearls. – (Photo S. Steidl, LEIZA). – Scale 1:1.

Fig. 11 Three pendants with granulation. – (Photo S. Steidl, LEIZA). – Scale 1:1.

Fig. 12 Large necklace with 28 enamelled plaques. – (Photo S. Steidl, LEIZA). – Not to scale.

Cleaning and Restoration

First, all the objects were studied under the microscope in preparation for the restoration process (**fig. 17**). Mechanical damage, dirt layers, corrosion products and remnants of former treatments had to be identified, resulting in the conclusion that all the objects were in need of cleaning, and in some cases stabilising and reassembling.

Some of the objects had been copied in the past and mould-making materials, such as silicon-rubber and plasticine used in this process, had left traces on several of them. Remains of earlier, undocumented restorations – such as adhesive residues – were also identified on the objects. In addition, thin lime concretions had formed over the course of the roughly one thousand years the treasure lay buried in the ground.

The objects were then mechanically cleaned under the microscope. Materials resulting from earlier (albeit undocumented) restorations had to be removed where the methods of stabilising an object were insufficient. An example is

Fig. 13 Enamelled earring with peacock on the central medallion. – (Photo S. Steidl, LEIZA). – Scale 1:1.

Fig. 14 Two enamelled spherical pendants with *cloisonné* enamel. – (Photo S. Steidl, LEIZA). – Scale 1:1.

Fig. 16 Eleven appliques made of sheet gold. – (Photo S. Steidl, LEIZA). – Scale 1:1.

Fig. 15 Two silver spoons. – (Photo S. Steidl, LEIZA). – Scale 1:2.

Fig. 17 Examination of the enamelled necklace under the microscope by M. Heinzel. – (Photo R. Müller, LEIZA).

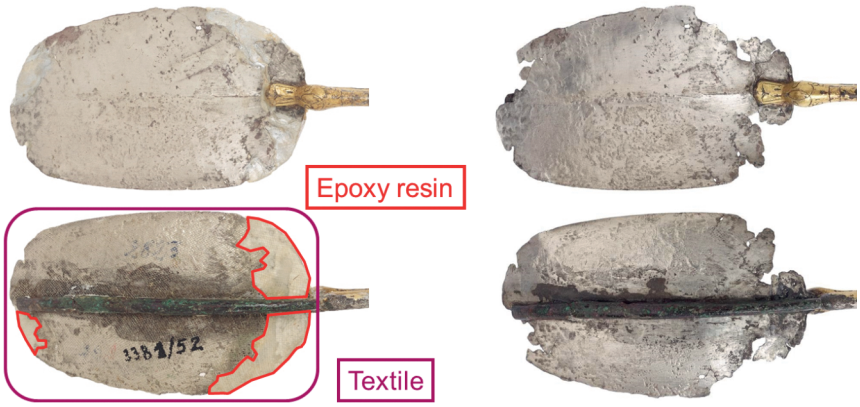

Fig. 18 Bowls of the two silver spoons before restoration (right) and after (left). – (Photo S. Steidl, LEIZA).

Fig. 19 The rhombic pendant after restoration (compare **fig. 4** for the condition before restoration). – (Photo S. Steidl, LEIZA). – Scale c. 2:1.

Fig. 20 Gilded silver plaque with confronted peacocks before restoration (right) and after (left). – (Photo S. Steidl, LEIZA).

the rough synthetic textile in combination with a thick layer of glue on one silver spoon[20] that needed to be removed (**figs 15. 18**). The glue-soaked textile had covered the original parts of the spoon to such an extent that it obscured the morphology of the surface and decorative details. Another important aspect of the restoration work was reassembling fragments, as well as stabilising very fragile parts and complete objects.

Examples

A gold pendant with precious stones, pearls and stone settings, with remnants of a filling material[21] (**fig. 4**), was entirely contaminated with plasticine and silicone rubber. Thin layers of calcareous concretions covered parts of the gold surface. Most of these materials were removed mechanically, using soft tools such as wooden sticks, cotton-swabs and soft brushes, with locally restricted use of de-ionised water, ethanol and weak acids. To remove the plasticine, a combination of ethanol and de-ionised water, applied with cotton-swabs and soft brushes, was effective. The silicone rubber was removed mechanically with the help of wooden picks and other soft tools, without employing fluids. Traces of calcareous layers were dissolved and removed using a weak acid (diluted citric acid), but due to the fluid's nature, any contact of the solution with the pearls had to be strictly avoided. After this procedure it was therefore necessary to neutralise the treated areas with de-ionised water. As a result, the precious stones and the gold regained their former lustre (**fig. 19**).

Substances remaining from earlier restoration treatments on some objects affected their visual impact, for example, the gilded silver plaque with confronted peacocks[22] (**fig. 20**): the two fragments had been agglutinated incorrectly, using a large amount of epoxy resin, which had to be removed. This was achieved with diamond grinding tools, without touching the soft silver surface. After separating the two parts of the peacock plaque, the surface was cleaned with de-ionised water and ethanol using cotton-swabs and soft brushes, as well as a soft rubber pen. The two fragments were then reconnected and stabilised on the back with reversible glue (Paraloid B-72), supported by a silk fabric. On other objects, wax-like substances had to be removed with soft brushes and a mixture of ethanol and de-ionised water.

A silver spoon decorated with two gilded duck-heads at each end of the handle[23] (**figs 15. 18**) showed three fractures that had been filled with epoxy resin during a previous restoration, and the spoon had been given a final coating of artificial silver varnish. These connecting materials had to be removed during the recent restoration because they obscured the original surface of the spoon. In order to stabilise both spoons, their parts were reconnected using Paraloid B-72, strengthened with a piece of fabric for stability. The cracks were left unfilled because this was not necessary for the stability of the spoon and also left the fractures visible to reflect of the objects' biography.

The silver objects of the treasure, in particular, were covered with corrosion products, such as silver sulphide, silver chloride, and also copper corrosion products. These materials were removed or reduced with chemical solvents under the microscope using soft tools. To protect the silver surface in future, the objects were treated with a coating of Paraloid B-72.

During the cleaning process of the objects of the Preslav Treasure, it became clear that on the two pendants with emeralds and pearls[24] (**figs 2-3. 21-22**) some fragments of the precious stones had been joined incorrectly. The adhesive used before was first dissolved and the fragments were re-arranged in the right position.

The emerald fragment on the front of the pendant without pearls fits exactly to the fragment of the other pendant, while the fragment on the *verso* finds its exact counterpart in the fragment on the lower part (**fig. 21**). Another part of an emerald bead was found among the non-metallic objects of the Preslav Treasure (**fig. 22**): a total of four small items had been described as »glass«[25], but only the black and the blue objects were actually made of glass, while the two green

20 Museum Veliki Preslav, inv. no. 3381/52.
21 Museum Veliki Preslav, inv. no. 3381/3a.
22 Museum Veliki Preslav, inv. no. 3381/13.
23 Museum Veliki Preslav, inv. no. 3381/52.
24 Museum Veliki Preslav, inv. nos. 3381/3a and 3381/3b.
25 Museum Veliki Preslav, inv. no. 3381/39.

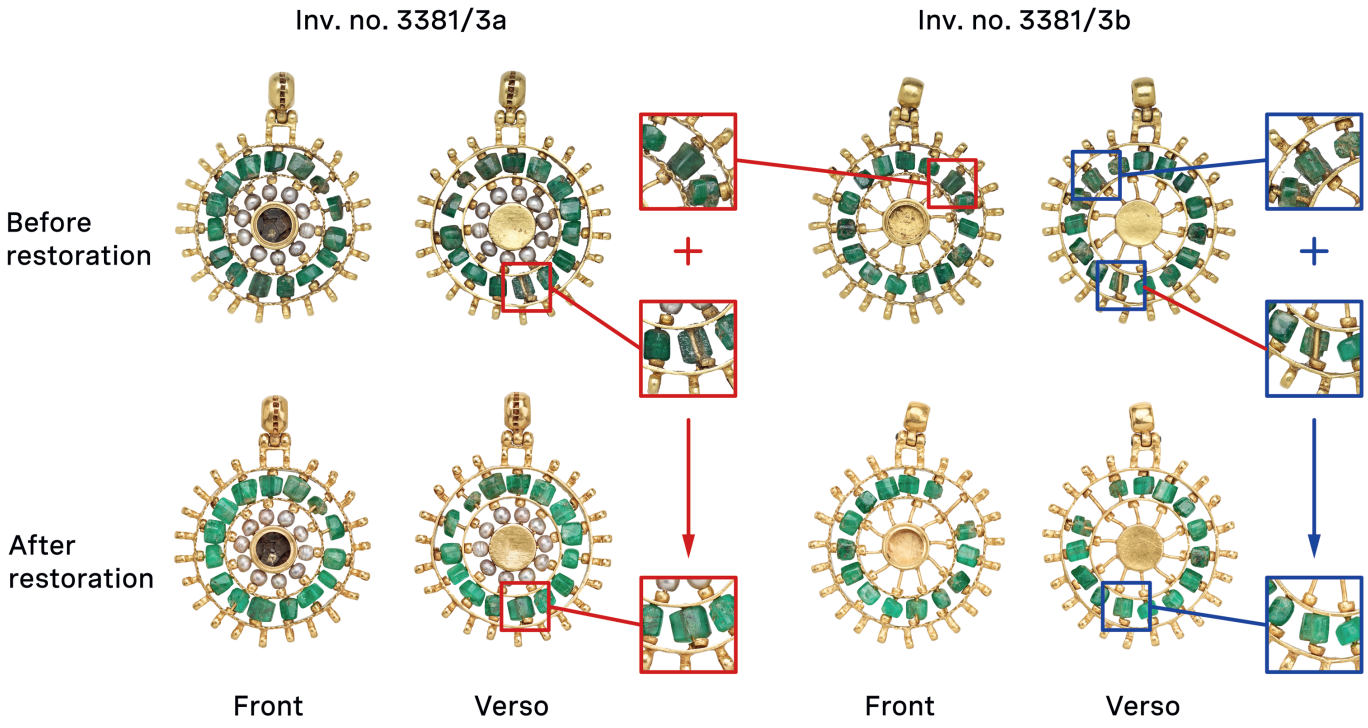

Fig. 21 The two pendants with emeralds and pearls before restoration (top) and after (below), and re-arrangement of the emerald fragments. – (Photos S. Steidl, LEIZA).

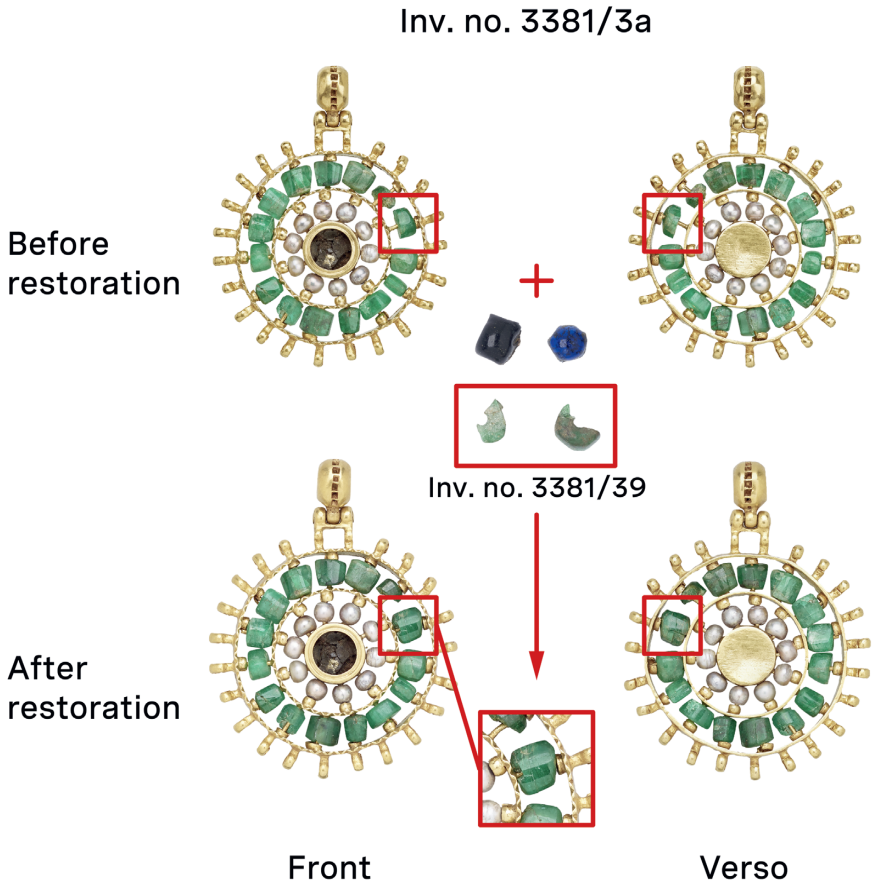

Fig. 22 The pendant with emeralds and pearls and the two emerald fragments, which fit exactly to the half emerald bead on the pendant. – (Photos S. Steidl, LEIZA).

Fig. 23 Fragments of a thin silver sheet with relief decoration before restoration (with plastic cover). – (Photo S. Steidl, LEIZA). – Scale 1:1.

fragments are emeralds. The two fragments originally belonged to the same emerald bead, but had also been joined incorrectly. The two fragments were then agglutinated in the right position with cyanoacrylate, a reversible glue.

It was only the examination of the two green fragments under the microscope that could clarify their identification as emeralds. They showed the typical hexagonal shape of an uncut emerald and proved to belong to the same crystal. The two joined emerald fragments turned out to fit exactly to one half of an emerald bead on the round medallion without pearls[26] and were added to this with the help of cyanoacrylate.

The fragments of a thin silver sheet with relief decoration[27] (**figs 23-24**), originally decorating the rim of a drinking vessel, arrived at Mainz fixed on a plastic plate and covered with plastic foil (**fig. 23**). These measures had been taken to secure and stabilise the extremely thin and fragile fragments. In Mainz, the plastic foil was removed and the fragments detached from the plastic plate. After cleaning and a thorough examination of the rims of the fragments, they were re-arranged and re-fixed (**fig. 24**). Because of the high fragility of the thin corroded silver sheets, the reverse of the object was stabilised using silk fabric in combination with Paraloid B-72. After restoration, the silver surface regained some of its original shine. Furthermore, it was now possible to position the fragments in the correct order and obtain a clearer picture of its relief decoration consisting of a chevron pattern, a plaited band, birds and other animals.

Fig. 24 Thin silver sheet with relief decoration after restoration. – (Photo S. Steidl, LEIZA). – Scale 1:1.

Further Activities

After restoration, all objects were placed into new boxes made according to modern standards, especially necessary due to the stress on the objects during transport[28]. Each object was cushioned in a separate box with an interior solid foam inlay, cut according to the shape and size of the objects (**fig. 25**). Another important part of the Preslav Treasure project was the investigation of the manufacturing techniques supported by scientific analyses. This work is work in progress and will be fully presented in the final publication of the Preslav Treasure.

26 Museum Veliki Preslav, inv. no. 3381/3b.
27 Museum Veliki Preslav, inv. no. 3381/56.

28 The boxes consist of synthetic material PS (polystyrol from Licefa art. nos. V3-40 and V3-74) or acid-free cardboard (KS 16 Stülpbox MW 1.65 mm graublau/naturweiß from Klug Conservation, art. no. 214701637). The foam was made using the high-standard material plastozote (polyethylen-foam from Wikotech, art. no. WO19310).

Fig. 25 Objects from the Treasure placed in new boxes for transport. – (Photo S. Steidl, LEIZA).

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Summary / Zusammenfassung / Résumé

The Preslav Treasure: Preliminary Report on the Restoration Conducted at the Leibniz-Zentrum für Archäologie (LEIZA), Mainz

The Byzantine Preslav Treasure was investigated in 2017-2018 at the Leibniz-Zentrum für Archäologie in Mainz within the frame of the research project »The Preslav Treasure from Bulgaria (Tenth Century)«. The main tasks for this project were to clean and restore the objects, and to analyse the manufacturing techniques. The processes involved removing remnants of mould-making materials from previous treatments and soil that had gathered during the roughly one thousand years the objects were in the ground. Furthermore, glue and other residues of previous undocumented restorations were removed and replaced. This led to an improvement of the visual appearance of the objects. Some fragments that had been incorrectly assigned could be re-connected with objects from the Treasure. Another important part was documentation using high-quality photographs and also microscope photographs. For safe transport and storage, new packaging was produced according to today's standards.

Der Preslav-Schatz: Vorbericht über die Restaurierung am Leibniz-Zentrum für Archäologie (LEIZA), Mainz

Der byzantinische Preslav-Schatz wurde im Rahmen des Projekts »The Preslav Treasure from Bulgaria (Tenth Century)« untersucht und befand sich von 2017-2018 im Leibniz-Zentrum für Archäologie in Mainz. Dort wurde er gereinigt, restauriert und analysiert, wobei im vorliegenden Text die Restaurierung im Fokus steht. Dabei wurden nicht nur die Überreste von früheren Abformungen sowie anhaftende Materialien der fast tausendjährigen Bodenlagerung entfernt, sondern auch Klebungen von früheren undokumentierten Restaurierungen beseitigt und erneuert. Dies führte zu einer erheblichen Verbesserung des optischen Gesamteindrucks. Auch einzelne fehlerhaft zugewiesene Objektteile konnten ihren korrekten Positionen zugeordnet werden. Weiterhin wurden hochauflösende Fotografien angefertigt sowie Mikroskopfotografien. Darüber hinaus wurden neue Verpackungen nach modernsten Standards für die einzelnen Bestandteile des Schatzfundes angefertigt, um den sicheren Rücktransport zu garantieren.

Le trésor de Preslav: rapport préliminaire sur la restauration au Leibniz-Zentrum für Archäologie (LEIZA) à Mayence

Le trésor byzantin de Preslav a été étudié dans le cadre du projet »The Preslav Treasure from Bulgaria (Tenth Century)« et a séjourné au Leibniz-Zentrum für Archäologie à Mayence entre 2017 et 2018. Il y a été nettoyé, restauré et analysé, la restauration constituant le point central du présent rapport. Ce travail a permis non seulement d'éliminer les restes de moulages antérieurs ainsi que les résidus accumulés pendant près de mille ans de conservation dans le sol, mais aussi de retirer et de renouveler les anciens assemblages issus de restaurations précédentes non documentées. L'aspect visuel général des objets s'en est trouvé considérablement amélioré. Certains fragments qui avaient été précédemment attribuées de manière erronée ont pu être reconnectés avec des objets du trésor. En outre, des photographies en haute résolution et des images prises au microscope ont été réalisées. De nouveaux emballages ont également été conçus selon les normes les plus récentes pour chacun des éléments du trésor, afin d'assurer un trajet de retour en toute sécurité.