

POPULAR SUMMARY

One of the significant discoveries of Polish archeology in recent years is dated to the first half of 11th century cemetery on the west side of the Vistula, north of Włocławek, in Bodzia. It is a necropolis with chamber tombs from the time of Bolesław Chrobry, well-equipped, with a distinct European context. Unusual in every respect: a small, elite population of people of external origin buried here, rows of the cemetery marked with lines of rectangular fences, elements of construction of chamber tombs from the north - west of Europe and characteristic for nomads burial chambers with annexes, unusual at that time in Polish and and finally, rare in Europe northern head facing of the dead. At this unique necropolis, one of the graves – nr D171 - also turned out to be unique. In a rectangular coffin made of oak planks with a padlock, an adult woman (30-35 years old) was buried with her head facing south. Among her equipment were found: fragments of the golden plaque as the obole of the dead, a coin of the Czech prince Bolesław II and a unique set (about 90 pieces) of mysterious, small red beads scattered around the head. They are the biggest phenomenon of this burial - made of red mineral, not found in early medieval Polish jewelry. The creation of such ornaments, due to the very small size (diameter 3-4 mm) and the scale of material hardness, required quite a lot of skills of the craftsman. The only known analogy to them is a set of 27 identical beads from the burial of a young woman (about 14 years old) at the cemetery at the church of St. George in Kostol'any pod Tribečom (Slovakia). This tomb, dated to the turn of the 10th and 11th centuries, is also unique - richest in the cemetery and at the same time one of the richest in Slovakia. The Oldřich I denar (bits in Prague 1012-1033, 1034) deposited in the grave is also unique - cut exactly at 12 o'clock obverse inwards. This find of obole of the dead in those areas is the earliest of the church cemeteries in the Czech Republic and Slovakia and is the only Czech obol of the dead in the Carpathian Basin. After basic analysis, Polish and Slovak researchers found that the ornaments were made of arsenic sulfide. Despite the centuries-old tradition of using arsenic sulfides (realgar and orpiment) in many areas of life and culture - from medicine to art and alchemy - having its origins in antiquity and known throughout the world, their use in the production of early medieval ornaments is surprising. In the planned research, many issues remain to be clarified, especially regarding the exact composition of the material from which the beads were made, its origin, and above all the technology and place of making such products. The collection of unique beads after interdisciplinary archaeological, mineralogical and geochemical research (including *PXRD*, *XRF*, *EDS*, *EPMA*, *EBS*, *RS*, *LA-ICP-MS*, *LOM* in significant Polish research centers) will provide extremely valuable information on the origin of the raw material used for their production. It will also allow the reconstruction of old technological processes leading to the production of this unique in Europe - and maybe even the world - jewelry. The current state of geological knowledge in the field of arsenic sulfides is extensive. The history of realgar and orpiment is also impressive - strongly associated with human activity for millennia, in almost every aspect: as pigments in art (illuminations of manuscripts, parchments), decorations of outfits, wide therapeutic spectrum (from the tradition of Chinese pharmacopoeia, through Hippocrates, Ayurveda, Dioscorides to modern medicine). Realgar and orpiment were also very desirable matter among Jewish and Arab alchemists, among others for transmutation into gold. It is known from written sources that in Europe synthetic orpiment and realgar were known, perhaps in the late Middle Ages. The method of obtaining them was described in detail by Agricola in *De Natura Fossilium* (1546). In the preliminary study of the beads from Bodzia it was found that they are made of arsenic sulfide - realgar or orpiment, but with an amorphous structure (so-called arsenic glaze) which is just synthetic arsenic sulfide. By the researchers of the subject, the technology needed to obtain this type of material is considered several hundred years later. In the face of such a scientific challenge, a group of Warsaw archaeologists and geologists decided to continue interdisciplinary research - but now detailed, with the widest possible archeometric instrumentation. The use of arsenic glaze for the production of early medieval ornaments is a phenomenon unique in the world and spreads new light on the beginnings of alchemy in Europe. Reconstruction the process of its production will be very important from the point of view of knowledge about the beginnings of synthesizing colored arsenic sulfides. The research team of the Project are planning archeometric studies of: ornaments (from Bodzia and Kostol'any pod Tribečom), reference raw materials (mineral samples from the mineralogical collection of the Institute of Geochemistry, Mineralogy and Petrology of the Faculty of Geology of the University of Warsaw) and experimental materials (arsenic glazes obtained according to source recipes). Based on the obtained base, it will be possible to compare the chemical composition of archaeological monuments with the data obtained for arsenic sulfides, originating from various deposits and arsenic glazes obtained from them. As a result, it will be possible to determine the source of the raw material used for the production of beads from the grave D171 in Bodzia and to trace commercial, culture-forming and political links between different geographical areas of emerging Europe. The results of the analyzes and the final elaboration of the Project's research will make a huge contribution to the field of Polish mediaeval science - a new presentation of the early stages of the formation of the Piast state, thanks to the materials found at the Bodzia site and their comprehensive study.