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Glass beads from a Scythian grave on the island of Khortytsia (Zaporizhzhia, Ukraine): insights into bead making through 3D imaging

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Abstract

Four glass beads from a Scythian burial on the island of Khortytsia (Southern Ukraine) were subjected to 3D imaging using micro-CT and photogrammetry. The aim was to reconstruct the process used to produce and decorate the beads by detecting and interpreting the traces left by the technological processes on the bead surface and in the glass body. It turned out that all the beads were obtained by winding hot glass around the mandrel. The distribution, size and shape of the bubbles in the glass matrix revealed by the micro-CT scans and the features observed during a thorough examination of the photogrammetric models allowed us to follow the movements of the bead maker during the formation of the bead body and its decoration, highlighting several details of the production processes such as the number of the superimposed layers and the direction of the rotation of the mandrel during both the formation of the body and the decoration of the bead. Some information about the tools also emerged, with particular reference to the shape of the mandrel, the possible use of a releasing agent and how tools were used to decorate the surface or to remove the beads from the mandrel. According to the archaeological classification, the beads considered here belong to three different types, that are considered chronological indicators of the fourth century BCE and are found in archaeological sites spread over an area extending for several thousand kilometers from the Black Sea coast to the Ural Mountains. This work enriches the knowledge of the micromorphology of beads found in Eastern Europe, which is rarely discussed in the scientific literature on the archaeological glass beads.

Keywords Glass beads, Fourth century BCE, Scythian culture, Micro-CT scan, Photogrammetry

Introduction

Glass beads are common finds in archaeological sites from prehistory to modern times, and through the combination of archaeological and archaeometric inferences they provide insights into the economic, social and cultural contexts as they are relevant markers of regional and long-distance exchange and relationships [1–6].

Archaeologists typically rely on typological categories to describe and classify the glass beads, which allows the comparison of the finds retrieved from different archaeological contexts according to a defined hierarchy of attributes obtained through close observation [7–10].

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