

## **Metal and its Origins: Investigating the Sources of Copper Utilized in Polish Territories during the Late Bronze Age and Early Iron Age**

In contemporary archaeometallurgical investigations, a primary objective is to delve into provenance studies and reconstruct the complex pathways of metal distribution. Comprehensive analyses of metalwork, encompassing stylistic, chemical, and traceological examinations, are essential for elucidating the dynamics of copper circulation in prehistory.

According to Polish literature, local prehistoric metallurgy poses various research challenges, particularly in understanding the origin of metals. During the later stages of the Bronze Age and the Early Iron Age (spanning the period of the Lusatian Urnfield Culture, circa 1350-450 BC), distinct metallurgical regions emerged in Poland: Silesia, Greater Poland, Kuyavia, or Eastern Pomerania. These regions are distinguished based on the presence of locally crafted products and a notable abundance of items (mainly tools) associated with metallurgy found in diverse contexts. However, metal objects are found throughout the entirety of the region occupied by the Lusatian Urnfield Culture. Determining the provenance of this metal is of critical importance.

The project aims to investigate the range and intensity of interactions within the Lusatian Urnfield Culture settlement area during the Late Bronze Age and Early Iron Age concerning the supply of raw materials, particularly copper. The primary research hypothesis is that during the Lusatian Urnfield Culture period, local societies participated in a pan-European commodity exchange network and that it is possible to distinguish zones of metal inflow from specific sources – regions rich in copper minerals.

The key research questions to be explored in this project include:

**Metal Origin:** Investigating the origin of copper used in the Lusatian Urnfield Culture settlement zone. Was it predominantly sourced from nearby mines in the Alps and the Slovak Ore Mountains, or did it come into Central Europe from alternative directions? The study aims to explore the possibility of using distant metal sources, such as the Western Mediterranean regions (Iberia, Sardinia), and analyse trade routes, including those along the Oder and Nysa Łużycka rivers. The research seeks to disclose the nature of interactions and exchanges between the Lusatian Urnfield Culture societies and neighbouring regions.

**Shape of delivered metal:** the study of the form in which metal was delivered to the Lusatian Urnfield Culture settlement area. Previous research indicates the absence of large plano-convex ingots in southern and central Poland, suggesting alternative practices in exchanging raw copper and bronze. This question aims to determine the various functions of metal artefacts in exchange practices through correlation with traceological, chemical, and lead isotopic analyses.

These interconnected inquiries provide insights into the origins and forms of metal in the Lusatian Urnfield Culture settlement area during the Late Bronze Age and Early Iron Age. The research also seeks to describe the metal exchange patterns. A comprehensive set of modern interdisciplinary research methods will be employed to address these questions, including lead isotope analyses, traceology, geographic information systems, and non-invasive prospection. This pioneering approach will yield a rich dataset of new analytical data, enabling the placement of Lusatian Urnfield Culture societies within the broader European metal exchange chain. Through an interdisciplinary perspective, connecting archaeological data with physical and chemical analysis, the results aim to elucidate metal provenance in distinct areas and the significance of a 'shape-based' (artefact-based) economy in Bronze and Early Iron Ages metal exchange.