

Tracing alabaster from carriers to artworks: focus on Carpathian quarries.

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Gypsum alabaster is a chemogenic rock formed as a result of sedimentary processes associated with the evaporation of water in closed or semi-closed basins where various minerals are deposited. In the Carpathian region of Ukraine, especially in its western part, alabaster formation processes are associated with ancient marine basins and salt marshes. The total thickness of evaporite and carbonate deposits ranges from 20 to 40 metres. Alabaster-grade gypsum or anhydrite that can be used for sculpture is usually very finegrained and is, in its white and often translucent varieties, free of impurities, even if coloured alabaster (black, green, red) exists.

Alabaster has long been used in architecture, decorative arts, sculpture and for making various products due to its aesthetic appeal and ease of working. However, the connection between alabaster as mineral and artistic material as well as commodity and cultural phenomenon is not fully understood so far.

. During the study of alabaster rocks in the Carpathians, many historical quarries and mines were re-discovered, from which high-quality pieces of alabaster for artistic works were extracted (Guliy et al., 2015). The extracted blocks were used for architectonic elements (e.g. columns) , decoration of interiors of residences (e.g. wall-cladding) , and sacred art.

The regular extraction of quarries in Ukraine began in the mid-16th century (Wardzyński, 2010). At that time, the stone was called Ruthenian marble or Lviv marble. Lviv was the centre of trade of this stone, and from there the products were distributed throughout Podillia, the Polish-Lituanian Commonwealth and as as far as Silesia. The main known quarries are located in the Ivano-Frankivsk region (Vasyukin, Rohatyn, Chernivtsi, Kukilnyky, Kolokolyn), Lviv region (Shchyrets, Pisky, Novosilky, Berezdivtsi, Zhuravno) and Chernivtsi region (Dubivtsi, Mamaluga), from which the samples presented here have been collected.

The aim of the project is to study both the geological, mineralogical, and petrological analysis of alabaster from historical quarries and other past mining sites, and to determine the origin of the material used for sculptures and small architecture in the 16th-18th centuries in territory of modern Ukraine and Poland.

Microscopic analyses (petrographic, mineralogical) showed that fine-grained alabaster is represented by relatively isomorphic gypsum grains (up to 10 µm). In a relatively evenly distributed mass of fine-grained gypsum, some large and long gypsum crystals (up to 600 µm) were developed. Alabaster has a hardness of up to 103 kg/mm², which is the most important difference between alabaster and other types of gypsum in the study area. In all morphological types of sulphate-bearing rocks, gypsum has a relatively stable chemical composition. Mg, Sr, Mn are part of calcite (Guliy et al., 2018).

The colour range of different morphological varieties of gypsum from the studied deposits varies from white, translucent (alabaster, selenite) to dark grey (fine-grained gypsum) and brown (large crystals).

We have studied 21 samples from historical quarries used by local sculptors in the Late Medieval and Early Modern period and compared these samples with materials from other European regions (Italy, France, Germany, Great Britain, Poland). S, O and Sr isotopic analysis showed that Ukrainian alabaster has unique characteristics that clearly distinguish it from alabaster from other regions and allow us to determine its regional origin (Kloppmann et al., 2017, Kloppmann et al., 2023, Lipińska et al., 2024). This allowed us to confirm the Ukrainian origin of the material of 15 alabaster art objects preserved in Lviv, Berezan, Dobromyl (Ukraine) and Krakow and Tarnów (Poland). Given the widespread use of Ukrainian alabaster, it can serve as an important indicator of historical cultural ties between Ukraine and its European neighbours.

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