



# First provenance evidence for lapis lazuli artefacts from Arabia: Analytical study of beads from the Umm an-Nar tomb DH7-1 at Dahwa, Sultanate of Oman

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## ABSTRACT

In this work, two wholly preserved lapis lazuli beads from an Umm An-Nar-type communal tomb excavated in Dahwa (2500-2000 BCE, Sultanate of Oman) have been analysed by means of non-invasive analytical techniques to try to determine the provenance of their raw material. The importance of these beads is due to the fact that they are possibly among the earliest lapis lazuli objects found in south-eastern Arabia to date. The combined results of the provenance and stylistic investigations presented in this work aim to assess the geological origin of the raw material used to produce these beads as well as their cultural affiliation, providing crucial insights into reconstructing the lapis lazuli trade between Western Asia and the Mediterranean during the third millennium BCE. To identify the lapis lazuli provenance, in-air ion microbeam techniques were used to measure the trace elements content and the luminescent properties of different mineralogical phases within the lapis lazuli rock. Data were compared with those collected over the past 15 years on rocks from five mining areas in Chile, Afghanistan, Siberia, Tajikistan and Myanmar. Using a protocol based on this rock database and exploiting a multivariate method (principal component analysis) on the compositional results, it was possible to prove that the raw material of the beads only matched the Afghan quarry district.

## 1. Introduction

Lapis lazuli is a semi-precious blue rock that was used since antiquity for the manufacturing of carved decorative objects, such as jewels, seals, or amulets. Its first use dates back to the seventh millennium BCE, in Mehrgarh (Pakistan) (Jarrige et al., 2013), but it was during the third millennium BCE that the greatest popularity of this rock occurred with a diffusion all over the Western and Central Asia (Hermann, 1968; Casanova, 2013; Vidale and Lazzari, 2017). The spread of lapis lazuli over such a vast territory and over such a long period of time has sparked archaeological interest in understanding the ancient trade routes of this

material, from the extraction sites to the final markets, due to their strict relation with information on the economic and cultural exchanges among populations in those areas.

Regarding the Asian sites of the extraction of the rock, most of the authors agree in considering the Badakhshan Province of Afghanistan (in particular the quarry district of Sar-e Sang) as the most important source of lapis lazuli in antiquity; however, some other less-known existing mining districts or sites only mentioned in literature have been debated by scholars as possible additional sources (Hermann, 1968; Zöldöföldi et al., 2006; Mindat Web Site). In order to provide a non-invasive method to investigate the provenance of lapis lazuli raw

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