

Analysis of faience beads from Early Bronze Age contexts at Tell es-Safi/Gath, Southern Levant





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Introduction

The definition of faience covers a range of artefacts and technological procedures, though in general it consists of a finely ground quartz or quartz sand, fused together with alkali and lime and coated with an alkali-rich glaze. It was first produced in Egypt and the Near East as early as the 4th millennium BCE¹. Although beads are commonly found in Bronze and Iron Age archaeological contexts in the Levant, their study rarely goes beyond description of shape and color and has been lacking analytical characterization at the microscopic scale in order to infer on technological aspects. This is especially true for beads dating to the Early Bronze Age, as most of the technological studies have been conducted on Egyptian and Aegean artifacts mostly dating to Late Bronze Age (New Kingdom, Minoan culture respectively).

A total of 38 beads securely dated to the Early Bronze Age III (2900-2500 BCE) were unearthed at Tell es-Safi/Gath. The beads were made from various materials; among semi-precious stones and shells, more than half (23) were identified as faience, and are the focus of this study. The beads were found on floors of various rooms and buildings. To the best of our knowledge this is the earliest assemblage of faience beads so far studied in depth from the Levant.

In order to infer on technological aspects, such as formation methods and, the use of raw materials and pigments, the beads were subjected to chemical and microstructure analysis using SEM-EDS, Infra-red spectroscopy and pXRF analyses. The results shed light on the production of early vitreous material during this period.



The Archaeological context

Tell es-Safi/Gath, located on the border between the central Shephelah (Judean foothills) and the southern Coastal Plain of Israel, is a ca. 50 ha site, identified as the Canaanite and Philistine city of Gath. Among the many periods of occupation at this site, excavations at Tell es-Safi/Gath exposed extensive remains of an Early Bronze Age III urban settlement. During this period, the site was fortified and extended to ca. 24 ha. in size. Excavations in Area E, located on the eastern slope of the tell, revealed a large residential neighborhood ².

Three architectural phases were identified, all assigned to the late EB III, based on both relative and absolute chronology. The buildings of the three phases (E5a-c) are similarly oriented, and share the same basic rectangular plan, which includes courtyards, rooms and various installations.





Typology

Beads were classified into types according to Beck's ³ typology, their shape and perforation type. Most of the beads in the assemblage exhibit simple shapes, with no decorative elements. It was noted that regardless of the beads material, perforation was identified as Type IV a large horizontal perforation drilled from one end.



Characterization

FTIR

The beads were initially characterized using Fourier Transform infrared Spectroscopy (FTIR). The advantage of FTIR spectrometry lies in its ability to provide useful

Faience





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Two main types dominated the faience assemblage, representing 61% of the assemblage, *Type-I.A.1.b* (rounded thin disc) and *Type-I.B.1.b* (circular short barrel).

information on mineral phases present in the samples analyzed, using very small amount of sample (ca. 0.2 mg) and with high sensitivity to order/disorder information about the analyzed phase. Among the 38 beads 30 (79%) were identified to be made of vitreous silicate materials; including 23 faience beads, 5 made of steatite, and one is an Egyptian blue bead



SEM-EDS

glass phase.

Scanning electron microscopy equipped with energy dispersive spectrometer (SEM-EDS) was used to study the microstructures of the beads and possibly identify technological characteristics. SEM-EDS revealed a typical faience microstructure, with a quartz core, most likely made of ground sand, an interaction layer and in some cases, a layer of glaze, coating the quartz body. However preliminary results show a diversity of alkalis compositions, use of colorants and manufacturing procedures. For some beads efflorescence glazing could possibly be inferred whereas other beads may have been produced through cementation glazing.

The Egyptian Blue bead presents the characteristic cuprorivaite crystals (CaCuSi₄O₁₀), which produce the blue color, and partially reacted quartz particles bonded together by varying amounts of

Conclusions:

- 1) The Early Bronze Age III bead assemblage from Tell es-Safi/Gath reflects a diversity of materials used during this period for bead making; it is nevertheless dominated by the use of vitreous silicate materials, including Egyptian Blue frit and faience.
- Preliminary microstructure analyses reveal a diversity of compositions, use of colorants, and manufacturing procedures. 2)
- 3) The provenance of the beads remains unknown. Whether beads were produced by local Canaanites possibly according to an Egyptian technological tradition, or whether they were imported from Egypt (or elsewhere), remains to be answered by future research.
- 4) It is however important to note that some similarities in bead-making technology were recently identified in an Iron Age I bead assemblage in nearby Ashkelon (late second millennium BCE).
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