

Technology of Late Bronze Age-Early Iron Age Glass in the Mediterranean: Analytical Studies of Vitreous Materials from Lofkënd

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Introduction

The prehistoric tumulus of Lofkënd is located in the Mallakstra region of Albania, southeast of the city of Fier, near the modern village of Lofkënd. The site was excavated from 2004-2008 by the Cotsen Institute of Archaeology at UCLA, Institute of Archaeology in Tirana, and the International Center for Albanian Archaeology and a total of 100 graves were discovered. The tumulus was primarily in use from the 14th c. BC to the end of the 9th c. BC, spanning the Late Bronze Age to Early Iron Age periods (Damiata et al. 2009). Many of the graves contained multiple individuals interred with grave goods such as ceramic vessels, fibulae, ornaments and bone pins.

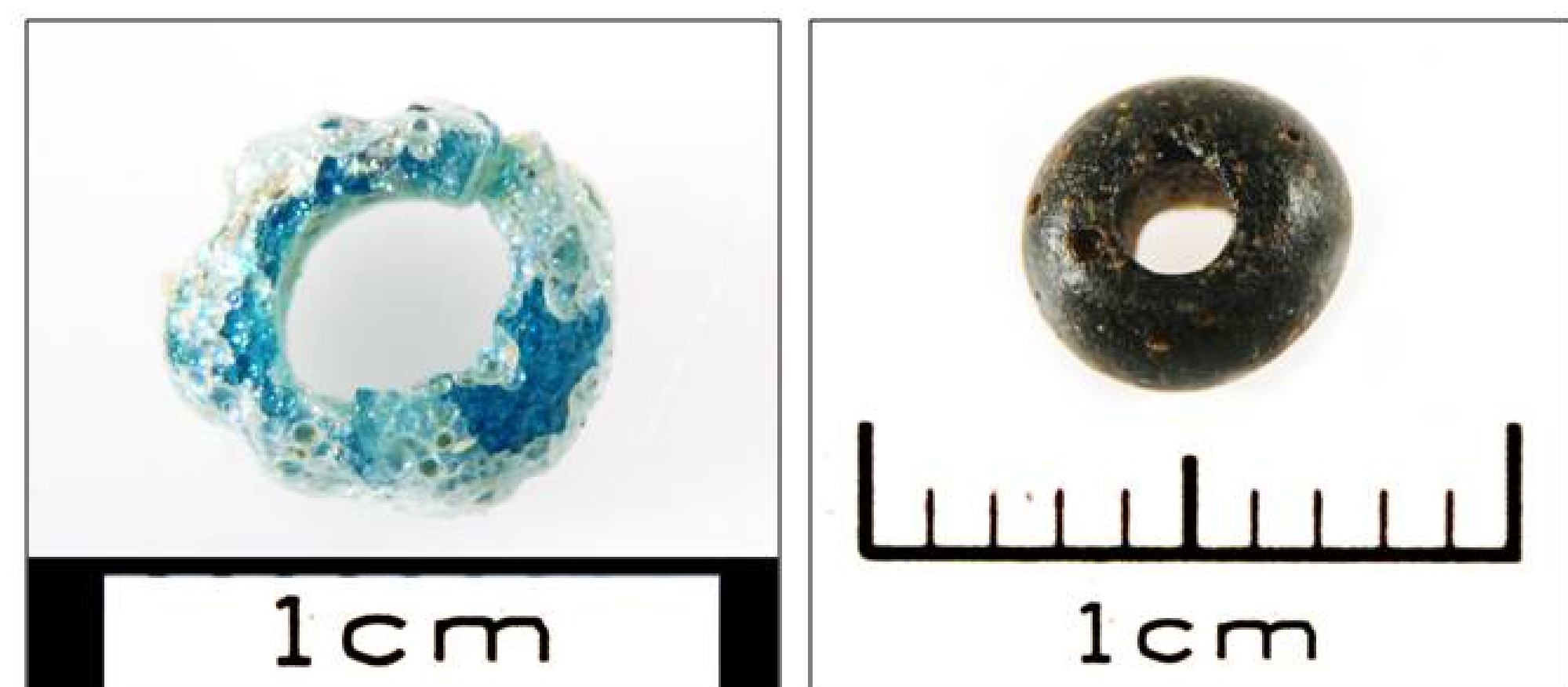


Tumulus of Lofkënd during excavation (L); A burial with various grave goods (R)

Vitreous beads were found in 4 graves dating to the 12th-9th c. BC, and were positioned on or around the skull of the deceased. It is this group of beads (10 glass and 1 faience) that are the focus of this research project.

Objectives

- Apply a multi-analytical approach, using more precise, and innovative, techniques to determine the composition of the Lofkënd beads and source the raw materials used
- Identify the primary production region(s) for the beads-whether from Egypt and/or the Near East (Shortland 2012), or if they can be related to Bronze Age production centers in northern Italy (Brill 1992) or Greece (Nikita and Henderson 2006)
- Use archaeometric data to answer questions about trade to southwestern Albania and technological innovations or continuity during the transition from the Late Bronze Age to Iron Age



T77-4 (SF338) Blue fluted bead

T53-8 (SF283) Dark greenish-black bead

Materials and methods

- Beads were examined using optical microscopy to create a bead typology (Beck 1924)
- Qualitative elemental analysis was conducted using a Bruker Tracer III-V handheld XRF under various acquisition parameters: no filter, 40kV, 1.6µA, vacuum, 180s; Ti-Al filter, 40kV, 1.6A, 180s; Cu filter, 15kV, 15µA, vacuum, 180s
- Samples from white decorative areas were analyzed with a Rigaku R-Axis Spider X-ray diffractometer (50kV/40mA, Cu target, 900s)

References

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Beads in situ with associated bronze objects

Results

Bead No.	Date	Material	Color	Decoration	Beck Classification	XRF Results
T55-8 (SF258)	12-11 th c. BC	Glass	Opaque white	Fluted	II.C.1.a/XXIII.A.2.a	Mg, Si, S, K, Ca , Ti, Mn, Fe, Cu, Sr, Zr*
T77-4 (SF338)	12 th -11 th c. BC	Glass	Blue	Fluted	II.B.1.a/XXIII.A	Mg, Al, Si, S, K, Ca , Ti, Mn, Fe, Cu, Sr, Zr
T77-5 (SF339)	12 th -11 th c. BC	Glass	Dark green	White wavy lines	VII.D.1.a/XLVII.A.7.a	Mg, Al, Si, S, K, Ca , Ti, Mn, Fe, Cu, Zn, Pb, Sr, Zr, Sb.
T77-7 (SF341)	12 th -11 th c. BC	Glass	Opaque orange-brown	White horizontal band	I.C.1.a/XLVII.A.1.a	Al, Si, S, K, Ca , Ti, Mn, Fe, Cu, Zn, Pb, Sr, Zr, Sb.
T77-8 (SF342)	12 th -11 th c. BC	Glass	Opaque yellow-brown		I.C.1.a	Al, Si, S, K, Ca , Ti, Fe, Cu, Zn, Pb, Sr, Zr.
T77-9 (SF344)	12 th -11 th c. BC	Glass	Opaque golden yellow	White spots	XLVI.A.2	Al, Si, S, Ca , Ti, Mn, Fe, Cu, As, Pb, Sr, Zr, Sb
T77-10 (SF351)	12 th -11 th c. BC	Glass	Light blue		too fragmentary	Al, Si, S, K, Ca , Ti, Fe, Cu, Pb, Sr, Zr.
T63-6 (SF294)	11 th -10 th c. BC	Glass	Opaque reddish-brown	White spots and a line	II.C.1.a/XLVI.A.2	Al, Si, S, Ca , Ti, Fe, Cu, Zn, Pb, Sr, Zr, Sb.
T63-8 (SF295)	11 th -10 th c. BC	Glass	Opaque golden yellow		too fragmentary	Al, Si, S, Ca , Ti, Fe, Cu, Zn, As, Pb, Sr, Zr
T63-9 (SF298)	11 th -10 th c. BC	Faience	Light blue-green glaze; whitish-yellow interior	Granulated	I.D.1.b/XXV.A.5	Al, Si, S, K, Ca , Ti, Mn, Fe, Cu, Zn, Pb, Sr, Zr, Sn
T53-8 (SF283)	10 th -9 th c. BC	Glass	Dark greenish-black		III.B.1.a	Mg, Al, Si, S, Cl, K, Ca , Ti, Mn, Fe, Cu, Zn, Pb, Sr, Zr

*Bold indicates major elements

Bead No.	Sample Description	XRD Results	Image
T77-5 (SF339)	Sample from white wavy line	Calcium antimony oxide, (CaSb ₂ O ₆) Antimony oxide (Sb ₂ O ₃)	
T77-7 (SF341)	Sample from white band	Brizzite (NaSbO ₃)	
T77-9 (SF344)	Sample from white spot	Calcium antimony oxide, (CaSb ₂ O ₆)	
T63-6 (SF294)	Sample from white spot	Romeite (Ca ₂ Sb ₂ O ₇)	

Conclusions

- Most of the glass beads were colored using an Fe based-colorant, regardless of the final color of the bead
- Two blue glass beads were found to be colored with Cu [T77-4 (SF338) and T77-10 (SF351)]
- The white decoration on the beads is due to antimony, primarily calcium antimonate
- The faience bead contained Cu, Sn and Pb in the blue-green glaze suggesting the use of bronze as the colorant (Shortland 2012)



T63-9 (SF298) Faience bead

Future Work

- Identify trace elements in the alkalis and Cu colorants using LA-ICPMS to obtain compositional information and determine their origin
- Source the silica in the glass using SIMS to identify primary production regions
- Some beads are severely deteriorated, though they are from the same burial context as better preserved beads. LA-ICPMS will be used to see if the alkali and/or colorants used relate to the deterioration/preservation observed



Samples mounted for future analysis

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