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Non-destructive analyses of Late Roman and Byzantine glasses from ancient Sicily: Methodological challenges and measurable results



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ABSTRACT

The study of glassmaking and glass trade in the Mediterranean region represents one of the most intriguing topics for Late Roman and Early Medieval archaeology. Until a decade ago, the identification of production centers and distribution patterns was mainly based on typological features and coloring of glass vessels. The growing popularity in the application of archaeometric techniques for characterization and study of archaeological artifacts has revolutionized the field of ancient glass studies. However, the critical lack of primary data and the limited use of analytical methods to determine the provenance of such materials has generated a gap in the knowledge, especially in important regions such as Sicily. The evidence emerged from two recent fieldworks brought the opportunity to test non-destructive techniques on an assemblage of ancient vessels to compare Late Roman and Early Medieval glass production technology and emphasizes evidence of continuity and discontinuity.

1. Introduction

Glass-making represents a relevant field of research for the study of transitions in Late Roman and Early Medieval material culture [1,2] especially from the perspective of trade and cultural exchanges between the Eastern and Western Mediterranean. In recent decades, the approach to Roman and Late Antique glasses has been revolutionized by the growing application of archaeometric techniques [3–8]. The analytical study of archaeological glass can provide great deal of information concerning the manufacturing techniques, the origin of the raw materials and the commercial connections among different production and trading centers, improving our knowledge of ancient social and cultural connections. Thanks to a great deal of research undertaken on glass objects found in archaeological excavations, a relatively precise classification of glass in different groups related to production sites and technologies can be obtained by simply looking to their composition in terms of major minor and trace elements.

With respect to the glass of Late Roman and Early Medieval Sicily, several works have been produced on isolated group of either pre-Roman and Roman or Byzantine materials coming from peripheral sites to the established center of economic and political power of the period,

Syracuse [9–11]. The evidence provided by Catania, where a Late Antique glass factory was installed in the ruins of the Roman Amphitheater, is extremely promising and points in the direction of a prominent production center [12,13]. In this recent literature, the Roman and Byzantine glasses were studied as separate groups without any attempts to compare the eventual different technology used in their production. Furthermore, the archaeometric techniques employed in that research were always destructive, a practice that is simply not sustainable considering the extreme frailty of glass specimens and their limited occurrence in the archaeological contexts.

In the light of the current state of research, this work aims at a comparative study of the chemical composition of glass samples dating to different historical periods, ranging from 3rd to 7th century AD from recent excavations at the church of *Sant'Agata La Vetere* in Catania and at the Catacombs of St. Lucy in Syracuse, directed by one of the co-authors. Both sets of samples have been analyzed with non-invasive techniques giving semi-quantitative results for the former and more precise quantitative results for the latter. Major elemental composition and trace-elements will provide information about the raw materials used and the possible differences and commonalities in glass production over a wide time frame.

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Fig. 1. Aerial view of Sant'Agata la Vetere Church with indication of the excavation area in the courtyard.

2. Archaeological contexts

The church of *Sant'Agata la Vetere* is located in a complex area of urban stratification. It is situated along an imaginary line that connects three religious buildings: *Sant'Agata alla Fornace*, *Sant'Agata al Carcere*, and the aforementioned *Sant'Agata la Vetere*, as shown in Fig. 1. All these churches are closely linked to the religious tradition and the worship of *Sant'Agata*, Catania's patron saint, and are placed in a strategic position at the core of Roman and Late Antique *Catania* [14–16]. During restoration works of the church, four campaigns of archaeological excavations (2003/2004, 2005 and 2008) were conducted in order to study the complex site around the religious building [17–19]. The archaeological interest in the site lies in the fact that it seems to have been affected by a progressive dismantling of a *domus* dating back to the between the 2nd and 4th centuries AD. This *domus* would have been built between the martyrdom of Saint Agatha (AD 251) and the construction of the church of *Sant'Agata la Vetere*, the first cathedral of Catania (AD 313).

The materials possibly related with the dismantling of a nearby *domus* come from a homogenous series of archaeological layers (SU 6, 11, 13, 16, 17, 22, 23 and 24) which must be interpreted as a sort of dump yard for disrupted architectural elements.

In an urban context of great complexity, such as the case of Catania, where the accumulations of anthropic deposits are alternated with layers of eruptive phenomena from Etna, archaeometric techniques are even more fundamental in the interpretation of these data.

Fragments of glass have been unearthed in different Stratigraphic Units (SU), from the oldest (SU 24, 3rd century AD) to the more recent one (SU 6, 6th century AD). Most of them are small fragments without diagnostic shapes and in strongly deteriorated conditions; a thick opaque crust is in fact superimposed on some very thin layers that are in contact with the glass bulk and generate some iridescent effects due to interference phenomena. A smaller group of more diagnostic specimens were identified according to the Isings system [20] (Fig. 2).

The second context is represented by the Catacombs of St. Lucy at Syracuse, one of the oldest and most important contexts related to the Christian communities of Sicily in the Late Roman period. Beneath the homonymous square, there is a large underground cemetery that was developed throughout the 3rd, 4th and 5th centuries AD, incorporating previous structures used for funerary, cultural and industrial purposes that were transformed into monumental burial chambers. The presence

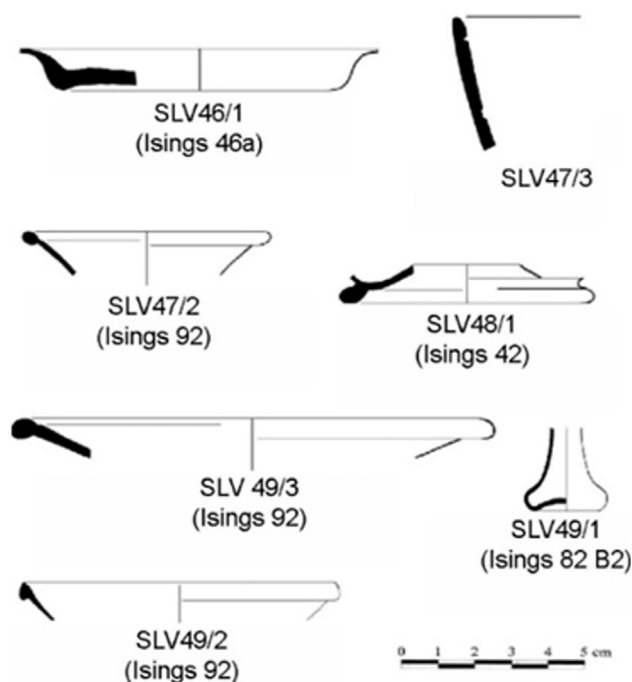


Fig. 2. Diagnostic glass ware from Sant'Agata la Vetere identified according to Isings system (drawings D. Cali).

of the tomb of St. Lucy guaranteed the popularity of the complex even after the end of its use as a cemetery in the 6th century AD. In fact, in at least two regions of the catacombs (A and C) new oratories were built, probably relating to the activity of nearby monastic groups. These groups substantially modified the layouts of the catacombs in order to create spaces required for their cult practices. Frescoes and devotional graffiti testify to a consistent exploitation of the oratories until the second half of the 13th century AD. After an initial exploration of the underground cemetery by Paolo Orsi in 1916–1919, who focused in particular on the topography of Region A, where the so-called Byzantine Oratory of the Forty Martyrs of Sebaste was discovered, the complex was documented by J. Führer at the beginning of the 20th century, who distinguished the cemetery into four regions (A, B, C, D) [21]. The systematic exploration of Region C was carried out in the early 1950's by S.L. Agnello [22,23] on behalf of the Vatican Committee for Sacred Archaeology. The archaeological excavations resumed only in 2011–2012 by the joint effort of the University of Catania and the Pontifical Commission for Sacred Archaeology with a series of interventions in the Region C, in particular the Oratory C and the area of the so-called 'Second Pagan Shrine'. Between 2013 and 2015 further excavations were undertaken by Arcadia University and the Pontifical Commission for Sacred Archaeology, again in Region C, with Oratory C and the area of the Second Pagan Shrine and Crypt VI as areas of interest [24] (Fig. 3).

Numerous fragments of glass vessels were found during the most recent excavations in the Oratory C, the 'Second Pagan Shrine' (Sector F) and the Crypt VI ranging chronologically from the 4th to the 6th–7th century AD, documenting a consistent use of glass objects in such contexts both in the cemeterial and post-cemeterial phases. The samples have different shapes and in most of the cases are just as poorly preserved as the ones of the first group, presenting the same flaking of iridescent surfaces and brownish encrustations. In some cases the deterioration is clearly so deep that it is almost impossible to find an unaffected portion of glass bulk. Since their typological study is still ongoing, it is not possible provide here any particular indication of their shapes. Their chronology is indirectly provided by other dating elements associated with the glass in the same stratigraphic unit, such as ceramics and coins.

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