

INTRODUCTION

This concise introduction aims to take account of the variety of topics which the papers collected under the title ‘From Pottery to Context. Archaeology and Virtual Modelling’ focus on, and draws attention to the *files rouges* which guided their selection. This collection is one of the main outcomes of a research project on a competitive call funded by the University of Bologna, entitled *Dal reperto al paesaggio: analisi archeologica e modellazione virtuale delle necropoli picene di Numana (AN)* (From Artifact to Landscape: Archaeological Analysis and Virtual Modelling of the Numana Picenian Necropolis).

The project concentrated on a sector of the Picenian Davanzali necropolis in ancient Numana (nowadays Sirolo - Numana, Ancona Province), excavated in the 20th century. Its primary aim was to experiment techniques for the acquisition of digital models of archaeological finds from funerary contexts and reconstructing the same contexts by modelling. The case study of Numana is well suited to this type of analysis, because of its complex stratigraphy and the variety of objects found in the grave goods. The attempt, completely new in this field of studies, involved the use of the typical methodologies of virtual archaeology, for the setting up of an entire funerary context, from the single object to the whole landscape. This approach stimulated the need for confrontation with the experiences of other research teams, which could provide useful comparisons. To discuss these topics the project should have included a workshop, planned for Spring 2020: unfortunately, the meeting could not take place, due to the global pandemic.

Hence, the idea of collecting a series of papers ranging from the problems of digital modelling of objects to the broader contextual issues under the title ‘From Pottery to Context. Archaeology and Virtual Modelling’ (which recalls directly the Numana project), giving the authors the opportunity to reflect on the relation between traditional and innovative approaches, on theoretical issues and methodologies, as well as on results and future developments of their research. These pages are therefore the alternative opportunity to present the contributions by those scholars who would have taken part in the meeting.

The essays draw attention to issues of investigation, which are now well established in scientific literature, but the purpose of their selection is primarily contributing to the broader debate with new research perspectives. This path of investigation fits perfectly in the way already paved four years ago by the KAINUA 2017 International Conference, published in «Archeologia e Calcolatori», and edited by A. GAUCCI and S. GARAGNANI (2017), who have taken part in the Numana project. The 2017 Conference focused on urban areas, taking *Kainua-Marzabotto* as a main case study. On that occasion,

P. Moscati summed up the projects and research on this specific topic in *Archeologia e calcolatori*, underlining an epistemological aspect that should be considered as primary: «Therefore, if nowadays technical training cannot be ignored, technology should not overshadow the ultimate purpose of the historical reconstruction and interpretation of the past» (MOSCATI 2017, 63).

In recent years «Archeologia e Calcolatori», one of the most established journals in the discipline, published a few contributions related to the application of photogrammetric and laser-scanner survey methodologies for the reconstruction of funerary landscapes (FARISELLI *et al.* 2017, where M. Silani, another researcher also involved in the Numana project, published) and funerary contexts (PUTZOLU, VICENZUTTO 2013). However, what is currently still missing is the systematization of all the data within a digital ecosystem that virtually simulates the funerary landscape in every aspect, from the particular to the general (see A. Gaucci below for further considerations and bibliographical references).

As already mentioned, the starting point comes from the research project financed by the University of Bologna on a sector of the Picenian necropolis (Davanzali) in ancient Numana. The considerations developed in this case study by the members of the research equipe from Bologna (see V. Baldoni, A. Gaucci, E. Zampieri, M. Silani, S. Garagnani below) open the collection. Their contributions, introduced by an overview of the topics by V. Baldoni, deal with different perspectives on the several subjects of the project, which intended to obtain the virtual reconstruction of the necropolis in all its elements, from the objects of the grave goods to the funerary landscape. The complexity of the context and of its interpretative issues stimulate reflection on a multiplicity of themes, such as the processing of archival data, the modeling of objects, the reconstruction of tombs and their grave goods, the funerary rituality, the dynamics of space occupation of the necropolis and the virtual reconstruction of the landscape. The experimented methods meet the need to reconcile digital model reliability - suitable to the multiple purposes of investigation - with a fast and efficient workflow. As we might notice, that is why this variety of research perspectives encouraged a methodological dialogue with other investigations, centered on study issues and on valorization of the different constitutive elements of archaeological contexts (mainly funerary ones), and centered on the application of digital acquiring and modelling techniques to archaeological finds.

Digital models of artifacts produced by the project can effectively contribute to the diffusion of the knowledge on ancient Numana's archaeological heritage, still little known. Indeed, these models and their narrative potentialities are meant to be important tools of divulgation for a wide audience, both in exhibitions and through a dedicated web portal. Besides this remarkable outcome, theoretical and methodological issues need to be addressed in order to achieve scientific goals. First of all, in our view it is necessary to work on

acquisition processes and understand to which extent it is possible to stress the acquired data and obtain a more traditional graphic documentation from them. Particularly, the latter issue has been widely discussed in various projects (see A. Gaucci below for some references), thus confirming its pivotal role in the current debate about documentation of archaeological finds.

That is why scholars were invited to contribute to the discussion on these topics with their research. Moreover, the submitted papers address two strands of research, considered to be of prime importance: figured pottery (Attic and Italiote) and serial production (here analyzed using the case study of architectural terracotta). In both cases, we are considering topics of particular interest, because of the strong knowledge potential and the challenges that such objects present, when digital modelling techniques are applied to them.

Significant space is dedicated to Greek and Italiote pottery, the subject of three contributions that deal with the in-depth analysis of the shape and decoration of the vases, with the complexity of their documentation and with the dissemination of their knowledge, considering different approaches. Largely attested in Numana, Greek or Italiote pottery are productions extensively studied, for which various methods of documenting and analyzing vase features have long been experimented; as mentioned, in recent years, various digital modeling techniques were also applied. The methods used for Greek pottery may also be useful in relation to the study of other ceramic productions, a field of investigation that could be further developed in the future.

The first contribution by I. Algrain and D. Tonglet (CREA-Patrimoine - ULB, Bruxelles) concentrates on vase shape: as demonstrated by these scholars, morphological studies have a consolidated tradition, they are still of great relevance in the scientific debate and have considerable perspectives for future development. Beginning with the historiography of the shape studies, the authors present the methods adopted in the study of some Attic vases (*alabastra* and *kyathoi*), emphasizing the importance of the comparative analysis for their profiles. This type of analysis not only proves to be of fundamental importance to deepen our knowledge of potters' activity – and consequently, of the Attic *ergasteria* – but (morphological studies) can also contribute to shed light on other relevant research topics, such as cultural exchanges and interactions.

The study of shape, style, and iconography is the topic of the contribution by A. Pace and D. Bursich (respectively, University of Fribourg and University of Salerno). The first part of the paper focuses on the digital modelling of ceramics as an important tool to know the style of Attic painters: through the analysis of 3D models of two *lekythoi* from Gela, A. Pace proposes a new stylistic framework of the vases, refining Beazley's classification. The second part of the paper (by D. Bursich) is dedicated to the working method adopted for the acquisition of the images up to the creation of the models and presents the results of their multi-year research on the digital treatment of Greek ceramics.

The following two papers converge on the analysis of serially produced objects, in particular, the possibilities of studying architectural terracotta through digital modelling techniques. This specific topic takes us away from funerary contexts. Indeed, both papers deal with the virtual reconstruction of the decorative elements of sacred architectural structures.

M. Natalucci presents her research on the fragments recently discovered in the sacred fence of the temple of *Uni* at *Kainua*-Marzabotto, excavated under the direction of E. Govi (University of Bologna). The application of archaeometric investigation methods leads to the reconstruction of the original polychromy (spectroscopy) and of the recursive decorative patterns (Visible-induced luminescence, VIL) of the architectural terracotta from the site. The research intends to retrace all the phases of the production of the architectural decorative system, from the raw pigments to the final 3D reconstructions. The study allows us to reach a philological reconstruction of the decorative system and to improve our knowledge of the local *chaîne opératoire*, but it also leads to the acquisition of new data on the activity and on cultural interactions of the craftsmen of *Kainua*-Marzabotto, who applied new pigments and techniques imported from Tyrrhenian Etruria, in the 5th century.

Another essay on architectural terracotta is presented by M. Esposito. It concerns a study coordinated by C. Rescigno (University of Campania Luigi Vanvitelli) about a conspicuous group of antefixes preserved in the Museo Provinciale Campano of Capua from 19th century excavations in the Archaic sanctuary at Curti (Caserta). The research focuses on the group called ‘female heads within the nimbus’, within which 30 series were recognized and catalogued in a database. It was possible to achieve 3D reconstruction of the prototypes through digital restoration of the fragments. Considering the seriality of this production, the fragments can be traced back to their archetypes: hence the possibility of obtaining reliable 3D models of the prototypes, using the laser-scanner. The paper also examines the process of acquisition and rendering of the models and, finally, discusses the aims for the knowledge, conservation, and diffusion of the mentioned corpus.

The last two contributions deal with different interpretations of the context through diverse research perspectives. Although these perspectives are antithetical, both clarify the cognitive potential of virtual context reconstruction. The first of these two papers reflects on the theme of the collection as a lost context to be traced again. The second one focuses on the funerary context, as a space already excavated and therefore to be reconstructed (similarly to what happens in Numana): the analysis leads to the study of the ancient landscape and its use in diachronic view.

The contribution by the team coordinated by M. Salvadori (University of Padua) presents a wide research project (MemO Project) on Greek and Italiote artifacts in the collections of the Veneto Region. Through a multidisciplinary

approach, the research intends to ‘recontextualize’ these finds, reconstructing their ‘memory’, i.e., the set of information they carry, thus making them important resources for study. The research integrates traditional methods of archaeological analysis with the most innovative techniques of modelling: several research purposes can be achieved, such as the study of production, reception, use and many others. Among these, there is also the theme of vase falsification, a phenomenon of great interest from a social and cultural point of view. A part of the analysis is dedicated to the digital modeling of the finds: the description of the laser-scanner acquisition process offers an interesting alternative to the method used for the finds from Numana. The contribution concludes by discussing the issue of heritage valorization: the characteristics and potentialities of the tool designed for this objective are examined, a database that also allows for the sharing of a variety of information on the web and is aimed at different categories of users.

Finally, the paper presented by scholars of Pisa (University and Scuola Normale Superiore) proposes a 3D reconstruction project of the necropolis of Volterra. In this case, the starting point is the context, the opposite of what happens in the research at the University of Padua: in Volterra, the tomb structures are preserved, but, since the objects of the funerary set are no longer there, an element of great importance of the context was lost. The approach here intends to restore the integrity of the context, through the virtual reconstruction of six hypogeal tombs, in which all the lost elements (movable and immovable) are relocated, intending to offer the audience an immersive visual experience, thanks to the use of low-cost mobile devices, which allow the fruition of information and metadata. The creation of this virtual environment is the result of an interdisciplinary cooperation and, in their contribution, the authors also address the method and the tools developed in the research.

In conclusion, I would like to thank all the scholars who have contributed to this volume and the University of Bologna, whose Alma Idea grants made it possible to pursue the project on the Numana necropolis and to edit these papers. Moreover, I would like to express my gratitude to the colleagues with whom I had the privilege to work on the necropolis of Numana, hoping that this fruitful cooperation will continue in the future.

Finally, I would like to express my thanks to Paola Moscati, for giving us the opportunity to publish these contributions in «Archeologia e Calcolatori», which in 1990 established itself as the first worldwide journal dedicated to information technology and archaeology, but always looking beyond technology.

VINCENZO BALDONI

Alma Mater Studiorum - Università di Bologna
vincenzo.baldoni@unibo.it

REFERENCES

- FARISELLI A.C., BOSCHI F., SILANI M., MARANO M. 2017, *Tharros - Capo San Marco in the Phoenician and Punic Age. Geophysical investigations and virtual rebuilding*, in GARAGNANI, GAUCCI 2017, 321-331.
- GARAGNANI S., GAUCCI A. (eds.) 2017, *Knowledge, Analysis and Innovative Methods for the Study and the Dissemination of Ancient Urban Areas, Proceedings of the KAINUA 2017 International Conference in Honour of Professor Giuseppe Sassatelli's 70th Birthday (Bologna, 18-21 April 2017)*, «Archeologia e Calcolatori», 28.2 (<http://www.archcalc.cnr.it/journal/idear.php?IDyear=20172-01-01>).
- MOSCATI P. 2017, *Archaeological computing and ancient cities: Insights from the repository of «Archeologia e Calcolatori»*, in GARAGNANI, GAUCCI 2017, 47-66.
- PUTZOLU C., VICENZUTTO D. 2013, *Il rilievo delle superfici tramite fotogrammetria 3D: dal microscavo dei complessi tombali agli scavi in open area*, in A. CURCI, A. FIORINI (eds.), *Documentare l'archeologia 3.0, Atti del Workshop (Alma Mater Studiorum Università di Bologna, 23 aprile 2013)*, «Archeologia e Calcolatori», 24, 355-370 (http://www.archcalc.cnr.it/indice/PDF26/35_Putzolu.pdf).