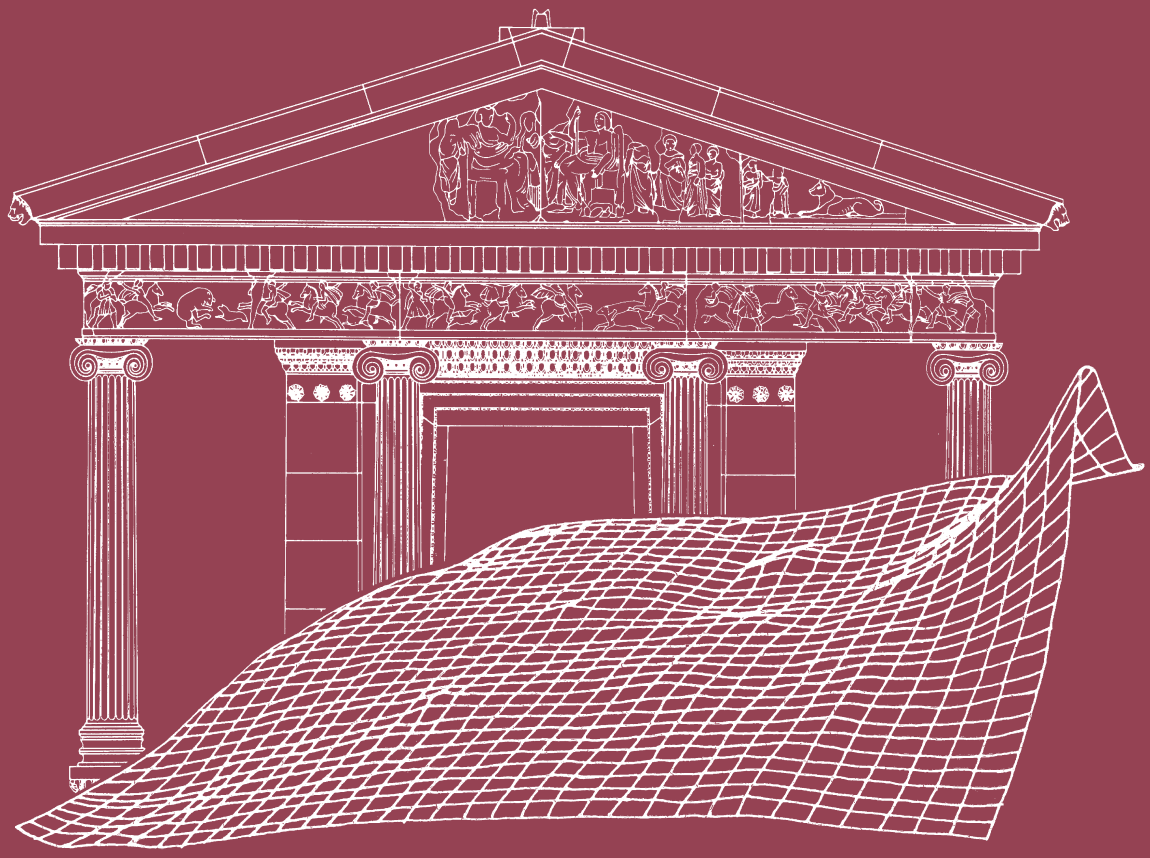

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INDICE

From Pottery to Context. Archaeology and Virtual Modelling, edited by Vincenzo Baldoni

Vincenzo Baldoni, *Introduction* 9

The 'Alma Idea' Numana Project

Vincenzo Baldoni, *From finds to landscape: archaeological analysis and virtual modelling of the Davanzali necropolis in the Picenian emporion of Numana (AN)* 17

Andrea Gaucci, *Virtual Archaeology and the study of necropolises as a system: methodology and practice in the case study of Numana (AN), Italy* 27

Enrico Zampieri, *The Davanzali necropolis of Numana (AN): from the archaeological context to the virtual environment* 35

Michele Silani, *Reconstructing the funerary landscape: natural environment and topography of the necropolis* 45

Simone Garagnani, *Quick digitization techniques: the case study of Numana necropolis* 53

From Pottery to Context: Methodologies, Practices, Case Studies

Isabelle Algrain, Delphine Tonglet, *Studying the shapes of Greek vases: historiography and new methodologies* 65

Alessandro Pace, Daniele Bursich, *New perspectives on documenting Attic pottery* 83

Marta Natalucci, *The rediscovery of colors at* Kainua-*Marzabotto* 95

Marta Esposito, *Antefixes from Museo Provinciale Campano in Capua. A proposal for a virtual reconstruction* 105

Monica Salvadori, Emanuela Faresin, Luca Zamparo, *Classical pottery in collection: the MemO Project and the recreation of a 'context'* 121

Emanuele Taccola, Lisa Rosselli, Niccolò Albertini, Marta Martino, *Etruscan hypogea in 3D: a proposal for an immersive and interactive visualization of Volterra's funerary contexts* 135

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Archaeological Computing: Selected Papers from the 2020 IMEKO TC-4 MetroArchaeo International Conference, edited by Alessandra Caravale

Alessandra Caravale, *Archaeological Computing and the MetroArchaeo International Conference Award: an introduction* 155

Elisa Costa, Carlo Beltrame, *3D modelling from archive and legacy data: preliminary data processing on the Roman shipwreck Grado I* 157

Angela Bosco, Laura Carpentiero, Andrea D'Andrea, Eleonora Minucci, Rosario Valentini, *Developing an ABIM system: a new prospective for archaeological data management* 167

Emanuele Brienza, Lorenzo Fornaciari, *Rome: NE slopes of the Palatine hill. Archaeology of architecture and ancient masonries deep analysis* 177

Andrea Tavella, Marika Ciela, Paolo Chistè, Annaluisa Pedrotti, *Preliminary studies on the volumetric capacity of ceramic from the Neolithic site of Lugo di Grezzana (VR) through 3D graphics software* 187

Enej Guček Puhar, Aleš Jaklič, Franc Solina, Lidija Korat, Miran Erič, *Anatomical-morphological analysis of a volumetric 3D model of an archaeological object* 197

Andrea Aquino, Stefano Pagnotta, Marco Lezzerini, Elena Pecchioni, Vanni Moggi Cecchi, Stefano Columbu, *From minerals to artefacts: the role and challenges of 3D modelling* 209

Paolo Triolo, Luciano Marras, Gloria Adinolfi, Rodolfo Carmagnola, Stefano Legnaioli, Simona Raneri, Vincenzo Palleschi, *Imaging as a first step for Cultural Heritage and archaeology analyses* 219

Sara Mazzocato, Claudia Daffara, Giacomo Marchioro, Alessandra Menegazzi, *Optical microprofilometry optimized for surface analysis and 3D printing of archaeological objects* 227

Dario Giuffrida, Viviana Mollica Nardo, Rosina Celeste Ponterio, Oreste Adinolfi, Maria Amalia Mastelloni, *Testing a mobile laboratory at the Aeolian Museum of Lipari (Messina) for the 3D survey and the chemical characterization of archaeological materials: practice and further developments* 237

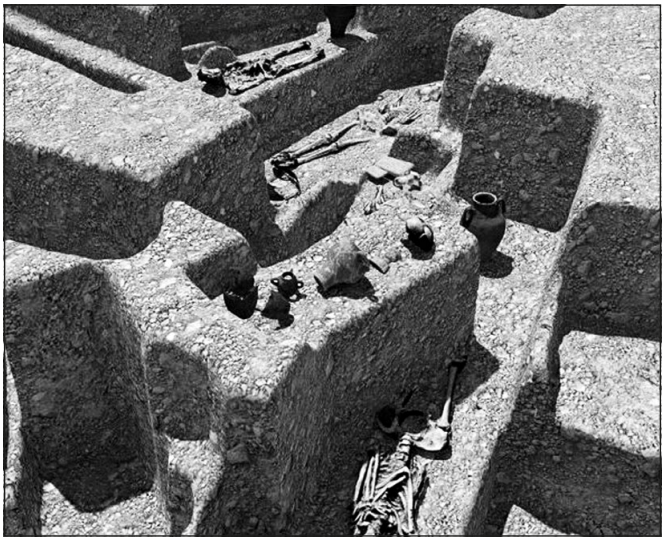
Devi Taelman, Dimitri Van Limbergen, Fabrizio Antonelli, *Architectural and sculptural decoration of Roman central Adriatic Italy: an archaeological and archaeometric approach to region-wide marble trade* 249

Salvatore Piro, Daniela Zamuner, Stefania Quilici Gigli, *High resolution geophysical surveys to characterise Norba archaeological site (Norma, Central Italy)* 261

Giovanni Leucci, Lara De Giorgi, Giovanni Fragalà, Antonino Mazzaglia, Daniele Malfitana, *New data about the Cathedral of Catania by geophysical investigations* 271

FROM POTTERY TO CONTEXT. ARCHAEOLOGY AND VIRTUAL MODELLING

edited by
Vincenzo Baldoni



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FROM FINDS TO LANDSCAPE: ARCHAEOLOGICAL ANALYSIS AND VIRTUAL MODELLING OF THE DAVANZALI NECROPOLIS IN THE PICENIAN EMPORION OF NUMANA (AN)

1. Recent research on the Davanzali necropolis and the 'Alma Idea' Project of the University of Bologna

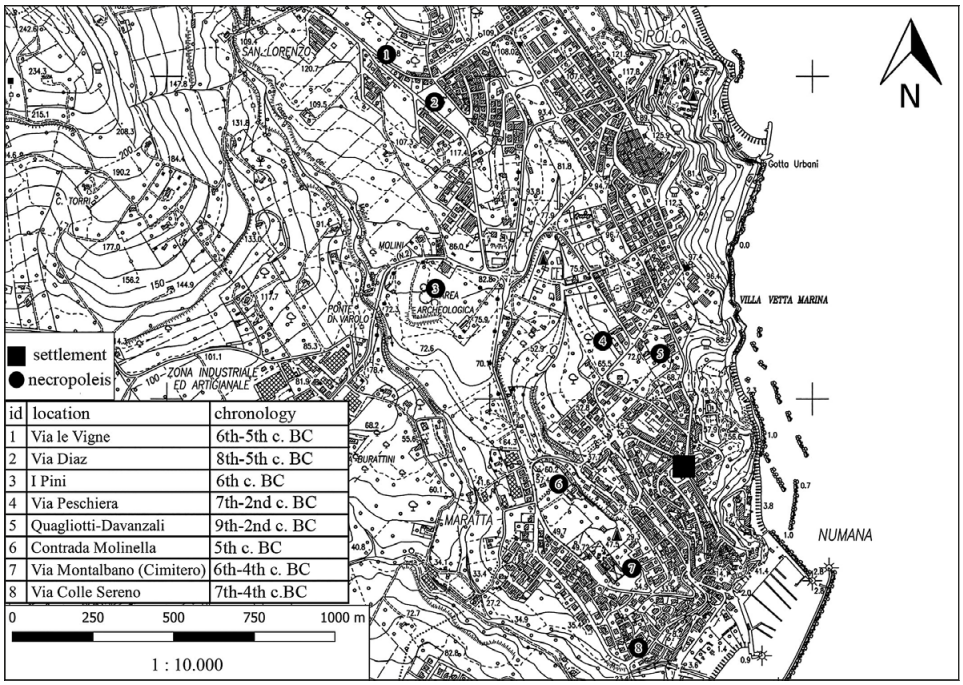
The Conero area, located on the middle-Adriatic western coast, for its natural characteristics and its location has always been a privileged place for trade, settlement and meeting people of different origins. The Picenian emporium of Numana developed in the Southern part of the Conero promontory during the first millennium BC: thanks to its privileged position and its natural harbor, it became one of the few suitable landing places along the western Adriatic coast. By the end of the 9th century BC these characteristics favored the birth of a settlement which was destined to become in the following centuries the most important emporium of pre-Roman Picenum, capable of establishing relationships with the Greek world, the Adriatic area, Tyrrhenian Italy, and Northern Europe (Finocchi 2018; Baldoni 2020 with previous references).

The period of the greatest development of the emporium is between the 6th and 4th centuries BC, when Numana became one of the strongholds of Greek trade (especially Athenian) along the Adriatic coasts. During the Hellenistic period (3rd-2nd century BC) Numana, like Picenum, seems to progressively shrink, as one of the results of the new historical setting, connected to the Roman control of the Region, while it became a *municipium* in the 1st century BC (Baldoni, Finocchi, Paci 2019; Baldoni, Finocchi, Ciuccarelli 2020; Baldoni, Finocchi in press).

The topography of pre-Roman Numana is not yet known in its comprehensive perspective: our knowledge mainly depends on funerary documentation from the necropoleis spread on this territory (today's territories of the municipalities of Sirolo and Numana) and we have only scarce evidence of the settlement (Fig. 1).

Despite the abundance of more than 1500 tombs investigated in Numana, only a few isolated contexts have been published; as a matter of fact, the edition of an entire necropolis or at least of a significant nucleus of burials is still lacking. This gap concerns both the knowledge of the topographical development and the relationships of the different funerary areas, as well as the numerous locally produced and imported finds from the grave goods.

In order to address these gaps in the knowledge of the archaeological heritage of ancient Numana, a few national and international research projects have been undertaken in recent years in collaboration with the



id	location	chronology
1	Via le Vigne	6th-5th c. BC
2	Via Diaz	8th-5th c. BC
3	I Pini	6th c. BC
4	Via Peschiera	7th-2nd c. BC
5	Quagliotti-Davanzali	9th-2nd c. BC
6	Contrada Molinella	5th c. BC
7	Via Montalbano (Cimitero)	6th-4th c. BC
8	Via Colle Sereno	7th-4th c.BC

Fig. 1 – Plan of ancient Numana (Sirolo, Numana, AN): location of the settlement and necropoleis (CTR-Regional Technical Map); plan elaborated by E. Zampieri.

Superintendency (SABAP Marche) and the Direzione Regionale Musei Marche: the University of Bologna has developed since 2015 a multi-year research on the necropolis Quagliotti-Davanzali (Finocchi, Baldoni 2017; Baldoni, Finocchi 2019). The research project on the Davanzali necropolis is coordinated by V. Baldoni for the University of Bologna, S. Finocchi for the SABAP Marche, and N. Frapiccini for the Direzione Regionale Musei Marche. This research has been followed by other projects of the University of Bologna with SABAP Marche, such as the one on the necropolis in the 'I Pini' area of Sirolo, still in progress.

The study of the Quagliotti-Davanzali necropolis focused on a topographically coherent lot of more than 240 burials located in the central sector of Davanzali area (Fig. 2), extensively investigated in the 20th century; the goal is to reach for the first time in the history of studies on the Picenian *emporium* a systematic analysis of a large funerary sector and of the correlated tomb contexts.

From the beginning, the research has imposed a reflection on the method and on the most suitable tools to effectively manage the large amount of data

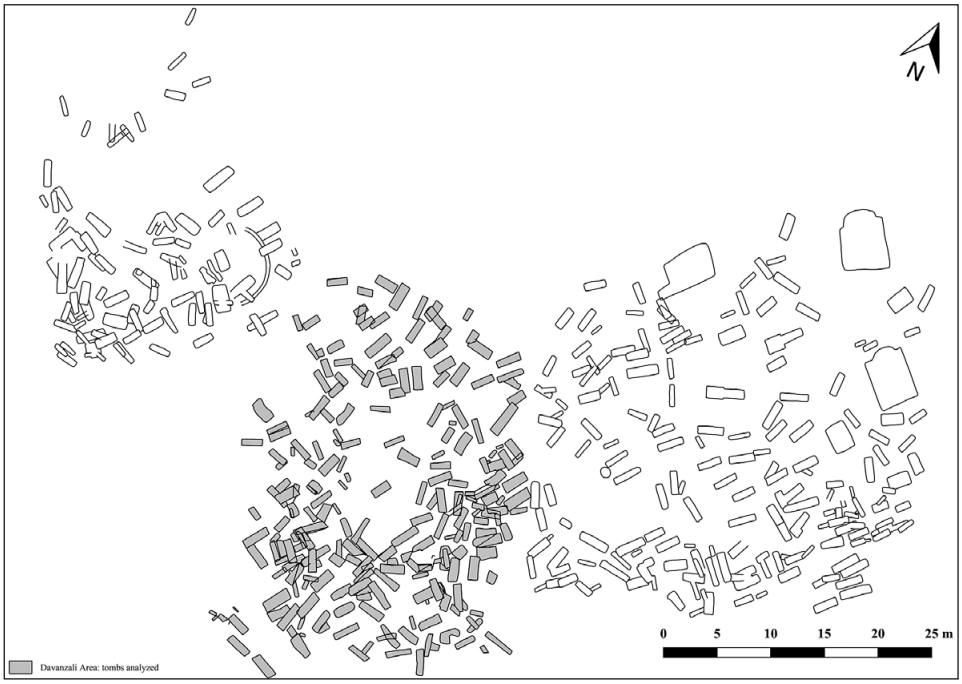


Fig. 2 – GIS of the Quagliotti-Davanzali necropolis (author E. Zampieri).

available and to answer the many questions to be addressed in the interpretation of such a complex funerary context. If the documentation produced during the excavation of the necropolis in the last century is very abundant, on the other hand it is also lacunose, because of the methods of excavation and documentation in use at that time.

Therefore, from the beginning it seemed useful to integrate the traditional research with other methods of investigation, specifically those of Virtual Archaeology, which can offer valid answers to the documentary gaps and effective interpretative tools of the context considered.

The opportunity to conduct the investigation in this perspective was offered by the competitive funding program 'Alma Idea' of the University of Bologna (2017-2020), a program aimed at the promotion and development of basic research. Thanks to this funding, a group of researchers focused on the application of virtual modeling techniques to the Davanzali necropolis (for a first presentation of the project, see also Baldoni *et al.* in press).

The aim of this project is the reconstruction of all the elements of the necropolis: the ancient landscape on which it was set and developed over

time, up to the single object laid in the grave goods, as the result of an action of the funerary ritual.

The method of virtual reconstruction had to be simple and quick and had to produce explorable and useful models for the study and the valorization of the context. Within the project it was possible to start the testing on a specific lot of tombs located in the central part of the burial ground, but the developed method could be applied in the future to the whole necropolis, in anticipation of its integral publication.

In the four following papers, the participants in the research group of the 'Alma Idea' project deal in detail with the single aspects of the work carried out.

In the first essay, A. Gaucci illustrates the theoretical and methodological framework of the research, offering an overview of some significant case studies of the application of Virtual Archaeology techniques, among which we can mention some recent projects conducted by the University of Bologna on Etruscan Po Valley contexts, such as the necropolis of Spina, Valle Trebba or the Etruscan city of Marzabotto. Starting from these examples, Gaucci evaluates the potential of digital models with respect to the case study of the Davanzali necropolis.

The subsequent contribution by E. Zampieri deepens the problems of the archaeological and topographical interpretation of the Davanzali necropolis, starting from the traditional excavation documents. Then, the potentialities and the limits of the experimented methods for the creation of digital models of the necropolis and of the objects of the grave goods are highlighted. Finally, a reflection on the first results of the project and on its future perspectives is offered.

The essay by M. Silani is dedicated to the theme of reconstruction of the ancient landscape: the geomorphological characters, the topographical and archaeological data are taken into consideration, including those coming from new survey activities carried out during the project. The contribution formulates reconstructive hypotheses of the topographical plans and offers useful elements that contribute to the achievement of a reliable reconstruction of the terrain on which the necropolis was set up and developed through the centuries.

The last article by S. Garagnani illustrates the methods and the specific phases of the workflow used to obtain the digital model of the Davanzali necropolis. As mentioned, the experimentation is aimed at the creation of digital models of elements with very different scales. Regarding the macro-scale of the burial ground, the generation of the morphology of the necropolis landscape is obtained from the plans of the different phases of the burial ground. The final product is a 3D model of the necropolis at the time of the excavation from which plans and sections can also be obtained for the archaeological analysis of the burial ground in its diachrony and of the complex relationships of the

tombs. It should be pointed out that this last aspect is particularly useful in the frequent cases of concentration and overlapping of burial pits in sectors of limited extension.

As for the micro-scale of the objects of the grave goods, their modeling must respond effectively to the variety of forms, materials, surfaces and textures as in the case of ceramics, which are present in large quantities and are pertinent to different classes of production. The most effective procedure – even in the case of complex objects such as figured pottery – is that of photogrammetry, which allows the attainment of an exhaustive graphic and visual documentation which responds to multiple aims of study, cataloging and valorization of the finds.

2. Studying pottery from the Davanzali necropolis: digital models and new perspectives

As mentioned, the ceramics from the Davanzali necropolis are very abundant and varied. As a matter of fact, among the finds, there are classes of local and imported productions: these are fine pottery, figured and black-glazed (Attic, Italiote, Alto Adriatico), transport amphoras, dining, storage and cooking wares. The value of the project for the study of these ceramics is remarkable, both because the experimented method allows us to proceed to a rapid, reliable and objective documentation of a great number of finds, and because the digital models obtained offer different possibilities to deepen the analysis of the shapes and the decoration of the vases (see in this volume S. Garagnani, Figs. 1-2). Moreover, these models are explorable and interactive and can be used for their knowledge by scholars and non-specialists, as it is planned to do both through exhibitions and events and in a dedicated website (see below). Regarding the study of ceramics, digital models of the vessels are useful to deepen the analysis of form and decoration, when present. From these models it is possible to obtain both very detailed traditional images and overall views of the figured decoration: in both cases, important resources are available for the stylistic and iconographic analysis of the vases, since it is possible to explore every single element of the main and accessory decoration. For some time now, scholars have highlighted the potential offered by digital documentation and visualization techniques (laser-scanning, CT scanning, 3D photo-modelling: e.g. Trinkl 2013): as highlighted in the contribution of A. Pace and D. Bursich in this volume, it is possible to deepen the attribution of the vases and thus contribute to a wider knowledge of the activity of the painters.

Further important advantages offered by digital models of vessels concern the study of vase-shapes and the investigation on the relationship between shape and image, both central issues in the current scientific debate in this field

of study. Regarding the shape, the possibility to derive precise and reliable profiles of the vessels is a great advantage for the analysis of morphological details. It is therefore possible to set up the study of the different productions from the point of view of the activity of the potters, who, like the painters, can be identified on the basis of the formal details of the vases produced, which are characteristic of the hand of each potter. As well shown in the contribution of I. Algrain and D. Tonglet in this volume, the analysis of vase-shapes constitutes one of the most-lively topics in the panorama of recent ceramics studies: this field of research has a long and consolidated tradition – starting from the pioneering studies of Bloesch 1940 and 1951 – especially in relation to Greek and specifically Athenian production.

By focusing the analysis on the potters and the painters (in the case of figured pottery), it is finally possible to broaden the view on *ergasteria* and their functioning and, more generally, on the wider phenomenon of ceramic production.

Pottery found in the Davanzali necropolis constitutes a promising case study for this type of research, which is based on the analysis of decoration and shape: the findings, in terms of quantity and variety, offer many opportunities for analysis and future prospects for in-depth study, especially if one considers the current scarce knowledge of local production of Numana. Among the vases from the necropolis only a small number is yet published, most of which are Attic imports or belonging to the local Alto Adriatico pottery production.

A very interesting field of research is, for example, black glazed pottery, attested in large quantities and probably also produced in the Picenian area. Archaeometric analyses and further deepening, starting from the analytical study of the shapes, are already being planned on the black glazed production from the contexts of the Davanzali area.

The detailed documentation obtained from the digital models of the vases is undoubtedly useful for these research purposes: as a matter of fact, extrapolating the profiles of the vases from the digital models avoids some possible errors due to the subjectivity of the designer's hand and it is therefore possible to have a reliable graphic documentation on which to set up an analytical and comparative study of the various attested forms. An example is offered by a *skyphos* (Alto Adriatico production) from tomb 220 Davanzali with geometric decoration: the comparison between the profile of the vase realized by a draughtsman (Fig. 3) and the one obtained from the 3D model (Fig. 4) shows sensible differences in the curvature of the body, as well as a more consistent thickness of the walls, thanks to the extreme precision of the measures obtained from the photo-modelling (Fig. 5).

A further area of research is the analysis of the influences among different productions: formal, stylistic and iconographical affinities between local Alto Adriatico production and Attic, Italiote and Etruscan ceramics have already

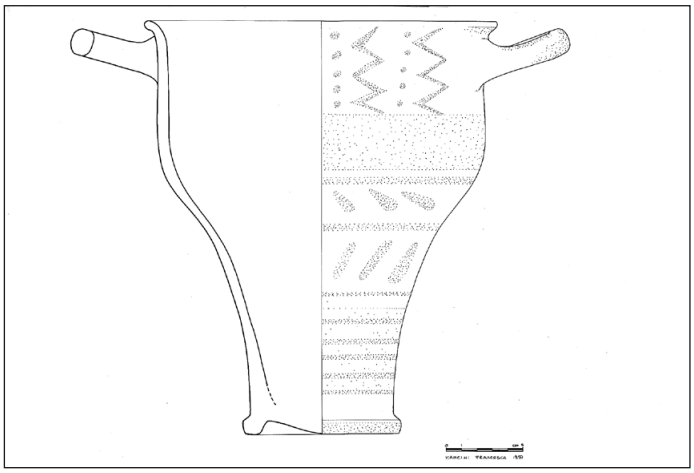


Fig. 3 – Profile of the *skyphos* from t. 220 Davanzali. Archive Sabap Marche Id. 28663 (author F. Mancini). Courtesy of Ministero della Cultura - Sabap Marche and Direzione Regionale Musei Marche.

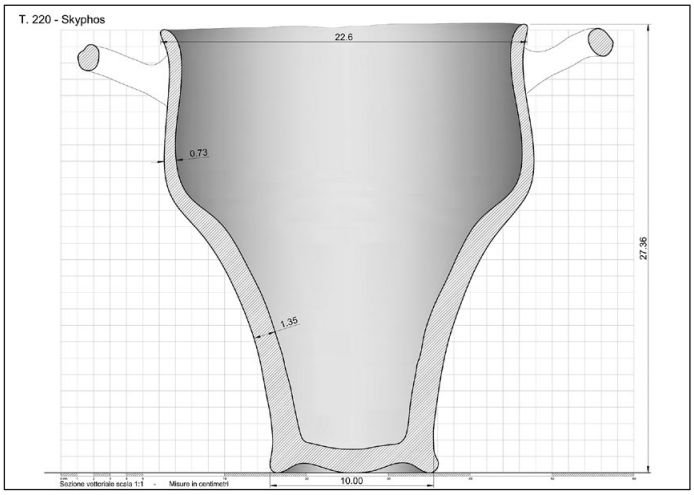


Fig. 4 – Profile of the *skyphos* from t. 220 Davanzali, obtained from the digital model of the vase (author S. Garagnani).

been highlighted by scholars, as in the case of kraters, *skyphoi*, *pelikai* and stemned plates (not to mention the similarities with the coeval red-figured and black-glazed vases produced on both Adriatic coasts). Furthermore, an articulation into groups of the picenian Alto Adriatico production was

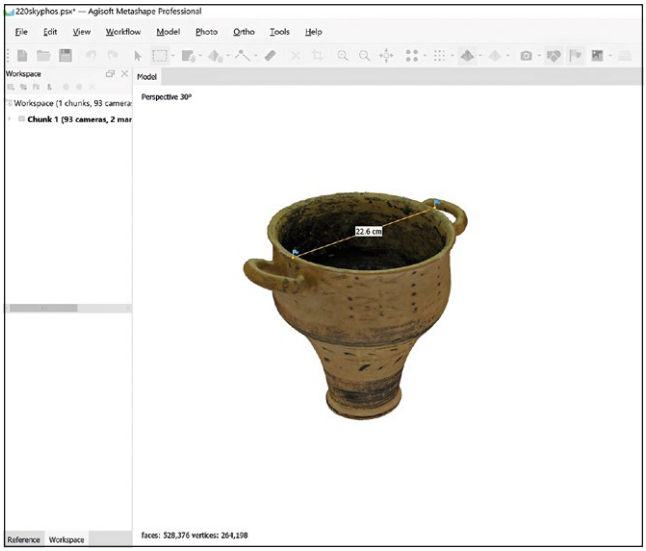


Fig. 5 – Photo-modelling of the *skyphos* from t. 220 Davanzali. Museo Archeologico Nazionale delle Marche, inv. 27428 (Courtesy of Ministero della Cultura - Direzione Regionale Musei Marche, author E. Zampieri).

proposed on the basis of the type of decoration (Landolfi 1997; 2000). The documentation methods experimented on the finds of the Davanzali necropolis can be used in the future on a larger scale for the analysis of the ceramics found in Numana in order to deepen our knowledge of local production, as in the mentioned case of Alto Adriatico pottery, where it is fundamental to consider both the characteristics of shape and decoration.

Within the limits of the project, it was possible to produce new documentation of a restricted group of objects, but in the future, thanks to the expeditive method developed, there will be the possibility of applying it to other finds. It will thus be possible to investigate important aspects, such as the development of the ateliers, the analogies and interactions between the productions, the diffusion of techniques and models and, finally, to identify possible phenomena of artisans' mobility.

3. First results and future perspectives of the project

At the end of the two-year project, we can assume that the results achieved are encouraging and that the application of Digital Archaeology methods provides effective tools for the study, dissemination and valorization of the necropolis and its findings.

From the perspective of its scientific impact, the 3D model of the Davanzali area allows us to address some of the gaps in the traditional documentation and to approach the analysis of multiple issues of funerary archaeology, such as the topography of the burial ground, the strategies of occupation of the area, the relationships between the tombs. The reconstruction of the tomb structures and of the grave goods enables to deepen the analysis of other aspects of the funerary rituality.

The digital model of the necropolis also can serve to increase the visibility of the context, which can be explored and used in different ways. This goal is in line with the policy of valorization of the archaeological heritage of the territory of ancient Numana. Very recently the valorization project 'Archeodromo' has been developed by Parco Regionale del Conero with local and national institutions (SABAP Marche and Direzione Regionale Musei Marche), in which techniques of experimental archaeology are used and infrastructures dedicated to the diffusion and promotion of the archaeological heritage of the territory to a wide public are created. This project also includes the virtual reconstruction of another important funerary context, the so-called 'Queen's Tomb' (end of the 6th century BC), discovered in the nearby necropolis 'I Pini' in Sirolo.

The digital reconstruction of the Davanzali necropolis can also be used to spread its knowledge among scholars and the wider public of non-experts through the website dedicated to the project (https://site.unibo.it/dal-reperto-al-paesaggio-numana/it). The web portal is intended to be implemented over time and it is designed to contain both the virtual model of the necropolis and of many objects of the grave goods: they are real replicas, viewable for scientific or cognitive purposes even in their smallest details. The digital models will also be used for events, exhibitions (including virtual ones) dedicated to the knowledge of the necropolis, also through immersive experiences with 3D viewers.

In conclusion, it is foreseeable that the results of the project will have an impact on different levels. On the scientific level, the models realized will allow scholars to deepen their knowledge of the funerary archaeology of the Picenian *emporium* and of its material culture, until now only in part known. For the wider public, the possibility of visiting and getting to know, from any place, the objects of the grave goods and their finding context constitute an opportunity to learn about a heritage that is largely located in museum storerooms (finds) or that is no longer currently visible on the ground (necropolis).

Therefore, the project also constitutes a great opportunity to study and valorize the copious archaeological heritage of Sirolo and Numana, a patrimony which for its richness certainly deserves to be known and appreciated more and more in the near future.

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ABSTRACT

Among the studies recently promoted by the University of Bologna on the Picenian necropolis of Numana (Sirolo-Numana, AN), a two-year research project has been dedicated to the application of digital archaeology techniques on a topographically consistent lot of tombs in the Davanzali area. Thanks to the financing of the University program 'Alma Idea', a team coordinated by the author focused on the virtual reconstruction of the necropolis, in all its aspects: from the finds to the funerary landscape. This contribution presents a synthesis of the research and introduces the articles written by the members of the team (A. Gaucci, E. Zampieri, M. Silani, S. Garagnani). The different contributions illustrate the project goals, methods and results. The conclusion of this article highlights the research potential for both the study (especially for pottery) and the context valorization.

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